Alberta Cancer Board

EPIDEMIOLOGY, PREVENTION AND SCREENING

Cancer in Alberta

A Regional Picture

July 2002

Alberta Cancer Board

ABOUT THE ALBERTA CANCER BOARD

Facilities and Services

The Alberta Cancer Board is a Provincial Health Authority operating cancer facilities and programs in Alberta. Services include cancer prevention, early detection, diagnosis, treatment, research and education. Also included in this role is coordinating in cooperation with others, the planning, development and delivery of provincial cancer initiatives.

As part of this mandate the Alberta Cancer Board operates:

- **Cancer treatment and research facilities:** Cross Cancer Institute in Edmonton and Tom Baker Cancer Centre in Calgary
- **Associate Cancer Centres:** Grande Prairie, Lethbridge, Red Deer and Medicine Hat
- **Community Cancer Centres** (in partnership with RHAs)**:** Headwaters RHA 3 in High River, RHA 5 in Drumheller, East Central RHA 7 in Camrose, WestView RHA 8 in Hinton, Aspen RHA 11 in Barrhead, Lakeland RHA 12 in Bonnyville, Peace RHA 14 in Peace River and Northern Lights RHA 16 in Fort McMurray
- **Division of Epidemiology, Prevention and Screening:**
    - **Population Health Research:** conducts research into population-based trends in cancer incidence, morbidity and mortality, the causes of cancer, prevention strategies and the early detection of cancer
    - **Alberta Cancer Registry:** a population-based registry of cancer cases in the province
    - *Screen Test:* **Alberta Program for the Early Detection of Breast Cancer:** a screening mammography and breast health education program with fixed-site offices in Calgary and Edmonton and mobile mammography services throughout the province
    - **Alberta Cervical Cancer Screening Program:** coordinates education strategies and materials; increases efforts to encourage participation of women who have not been regularly screened; and fosters quality at all stages of the screening process.
    - **Cancer Prevention Outreach:** provides a variety of services to RHAs, including cancer information, assistance with program and policy development and linkages to resources

The Alberta Coordinating Council for Cancer Control

The Alberta Cancer Board participates in the Alberta Coordinating Council for Cancer Control to connect cancer control efforts around the province and bring cancer services closer to home. The Cancer Coordinating Council extends the Alberta Cancer Board's expertise in cancer control programs (including prevention, screening, diagnosis, treatment, supportive and palliative care), cancer epidemiology and cancer research to urban and rural communities through collaboration with Regional Health Authorities and others.

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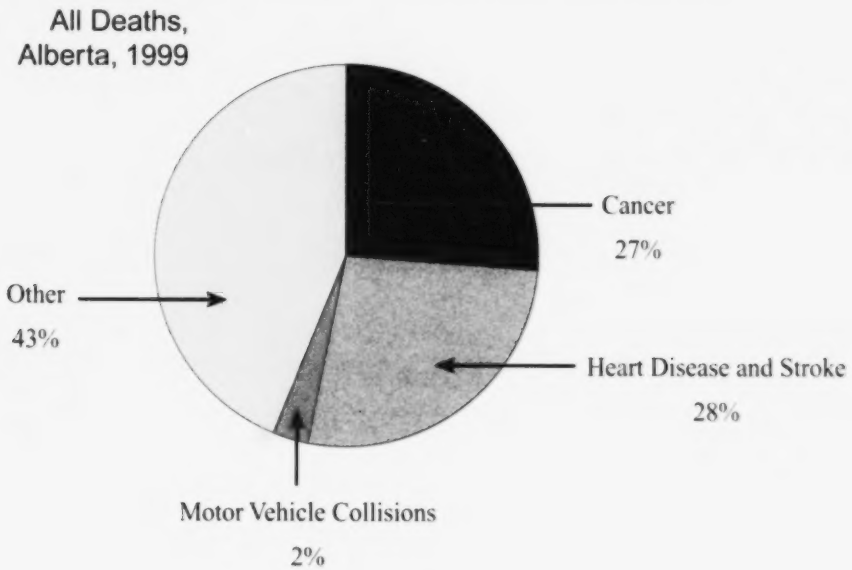
PREFACE

The Division of Epidemiology, Prevention and Screening is pleased to provide Cancer in Alberta: A Regional Picture. This publication is the fourth in a series of annual reports presenting data from our Alberta Cancer Registry on cancer trends and regional rates. It aims to provide health professionals and planners in Alberta's Regional Health Authorities with detailed information about common cancer sites to assist in priority setting and decision-making. Cancer is the second leading cause of death in Albertans, as shown below.*



The Alberta Cancer Registry registered approximately 10,000 new cases of invasive cancer (excluding nonmelanoma skin cancer) per year in 1997, 1998 and 1999. Over 6,000 people died of cancer per year in that period. To date, detailed statistics have been compiled through 1999. The data in this report are generally presented as three-year averages (therefore the data presented as 1998 are an average of 1997, 1998 and 1999).

For a better understanding of the information presented, please read *Understanding the Graphs* located immediately following the *Preface*. For details on data collection and coding, please see the *Technical Report* at the end of the publication.

Alberta statistics are contained in the bound portion of the publication. The Alberta data are organized by cancer site. Regional Health Authority specific data are located in the pocket inside the back cover.

New this year to the Alberta data are more detailed survival curves for lung, colorectal, prostate and breast cancer located in each of the aforementioned sections. In addition, the **boundaries of several RHAs changed in April 2001**. Hence statistics presented in RHA specific tables in both the Alberta and Regional sections of the publication are calculated using the new April 2001 boundaries and are thus not comparable to those presented in the 2001 Regional Picture report.

For more information contact Ellen Murphy at (403) 944-4888 or at ellenmu@cancerboard.ab.ca.

* Government of Alberta, *Alberta Vital Statistics* - Annual Review 1999

UNDERSTANDING THE GRAPHS

The examples below are given to aid in interpreting the graphs.

Three-Year Averages

The statistics in this report, including the number of cases, number of deaths, ASIR (age-standardized incidence rates) and ASMR (age-standardized mortality rates), are presented as three-year averages. Averages are used to smooth out year-to-year fluctuations so that the underlying trend may be more easily observed. This is important when the number of cancer cases per year is relatively small; in this situation year-to-year variability can be relatively large.

To calculate a three-year average for the number of events, the annual numbers are summed for three-years, centered on the year of interest and divided by three. For example, in the graph on page vi, the number of cases for all invasive cancers in Alberta men in 1998 is calculated by adding the total number of invasive cancers that occurred in 1997-1999 inclusive, then dividing by three. As shown in the graph on page vi, there were an average of 5,212 cases of invasive cancers in Alberta men in 1998.

The three-year averages for age-specific rates are calculated using the number of events occuring in three years and dividing by the totals of the population for the three years of interest. ASIRs and ASMRs are then calculated from the age-specific rates.

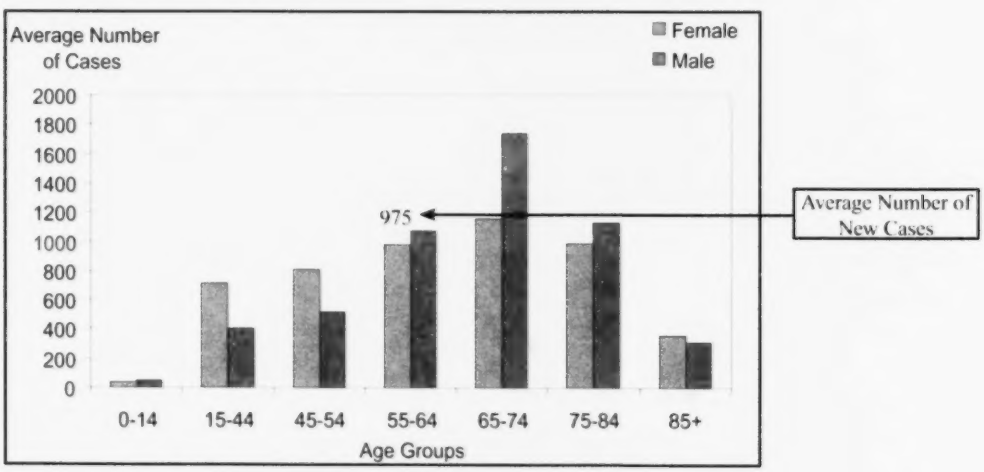
Average Number of New Cases and Deaths

In the body of this report, the average number of new cases/deaths is presented as a three-year average. For example, in the graph below, the average number of new cases for all invasive cancers in females in the 55-64 year old age group in 1998 is 975 cases, an average of the number of cases in 1997, 1998 and 1999.

The number of deaths is also presented as a three-year average and calculated in the same manner as new cases. Age-specific incidence and mortality rates are also presented as three-year averages.

The detailed figures in the Regional Health Authority inserts are not three-year averages.

New Cases by Selected Age Groups for All Invasive Cancers,
Alberta 1998 (average of 1997-1999)



Age-Specific Incidence and Mortality Rates

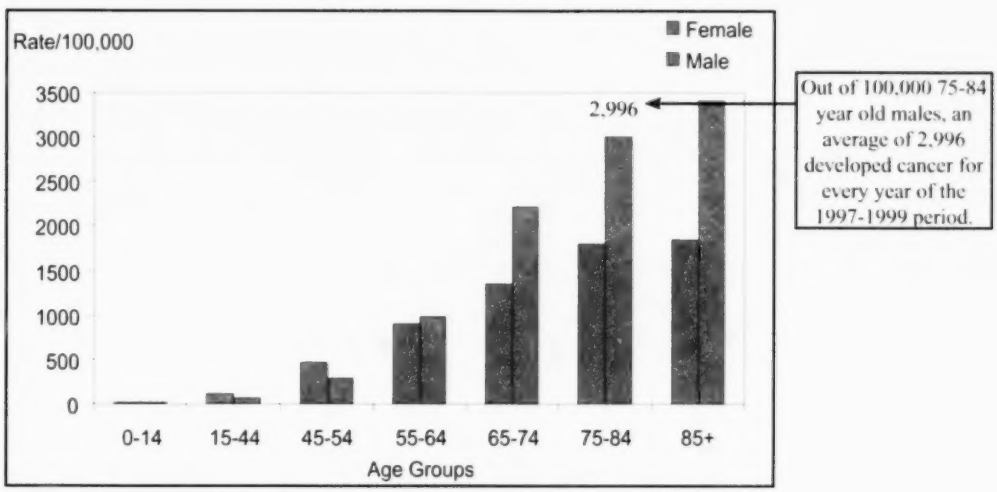
Age-specific incidence rates are used to compare the incidence of cancer among age groups. Age-specific incidence rates indicate the number of new cases that occur during a year in a specific age group, expressed as a rate per 100,000 persons in that age group.

The bars on the graph below indicate the age-specific rates for all invasive cancers in Alberta for 1998. For example, the age-specific rate for all invasive cancers in 75-84 year old Alberta males in 1998 was 2,996 cases per 100,000.

Usually the incidence of cancer varies sharply across age groups. Note that the incidence rate for all invasisve cancer is much higher in men in the 65-74, 75-84 and 85+ age groups compared with the younger age groups. In this report, age-specific graphs are only presented for *All Cancers*. For more information on age-specific rates for individual sites, please see earlier versions of this report.

Age-Specific Mortality Rates are expressed in the same manner.

Age-Specific Incidence Rates for All Invasive Cancers,
Alberta 1998 (average of 1997-1999)



Age-Standardized Incidence and Mortality Rates Over Time

Age-standardized incidence rates (ASIR) are used to compare cancer rates among populations where the population structures are different and to identify trends over time where the population structure changes over time. The age-standardized rate is a weighted average of the age-specific rates, using a standard population distribution. The standardized rates reflect the overall incidence rate that would be expected if the population of interest had an age structure identical to the standard population.

To calculate ASIRs, the actual rates (age-specific rates) of cancer in the Alberta population are applied to a standard population (the 1991 Canadian population). For example, the rate of cancer in each age group for 1980 in Alberta is applied to the 1991 Canadian population to determine the 1980 ASIR.

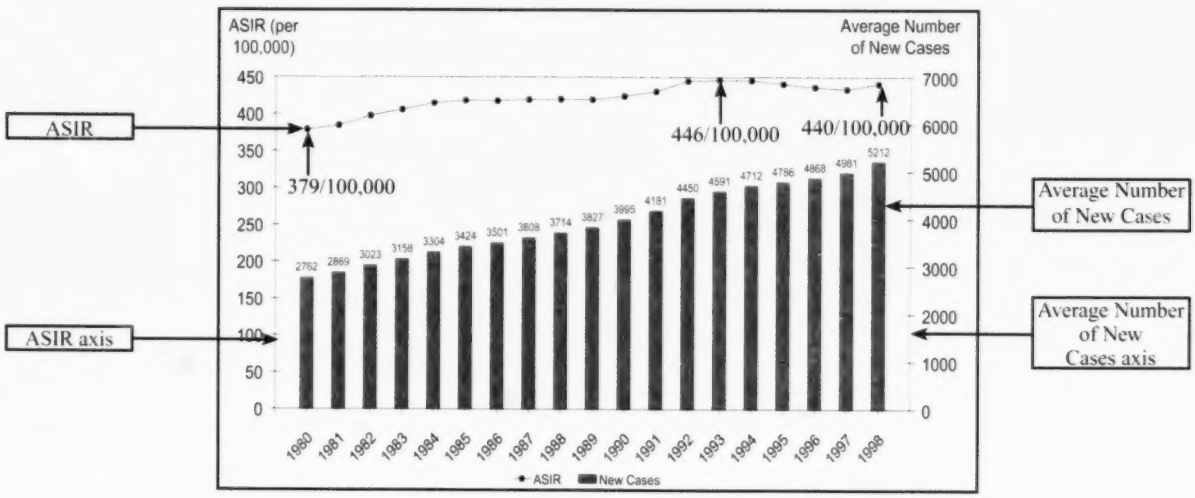
Alberta's population is aging and cancer incidence rates rise with age, therefore the number of cases of cancer is increasing. It is important to note that the increased number of cases does not mean that the rate of cancer is increasing. Comparing the number of cases of cancer in the younger and smaller 1980 population to the older and larger 1998 population gives an indication of the increased burden on the health care system, but does not indicate trends in the underlying disease rates.

Note on the graph below that the number of new cases for all invasive cancers in males increased from 2,762 in 1980 to 5,212 in 1998 as indicated on the blue bars. This is a substantial increase and has a major impact on the resources needed to care for patients with cancer. Using ASIR (the incidence rate for all invasive cancers in males standardized to the 1991 Canadian population) we see an increase from 379/100,000 in 1980, which peaked at 446/100,000 in 1993, and then decreased to 440/100,000 in 1998.

The 1991 Canadian population is used as the standard population in the calculation of ASIR in this document. It is also generally used as the standard population for Canadian and other provincial reports, except for those produced by Alberta Health and Wellness which use the 1996 Canadian population. The choice of 1991 or 1996 Canadian population as the standard has very little effect on the cancer rates presented.

Age-Standardized Mortality Rates are presented and standardized in the same manner.

Age-Standardized Incidence Rates (ASIR)* and New Cases for All Invasive Cancers, Males, Alberta (1980-1998)



*Three-year averages age-standardized to the 1991 Canadian population

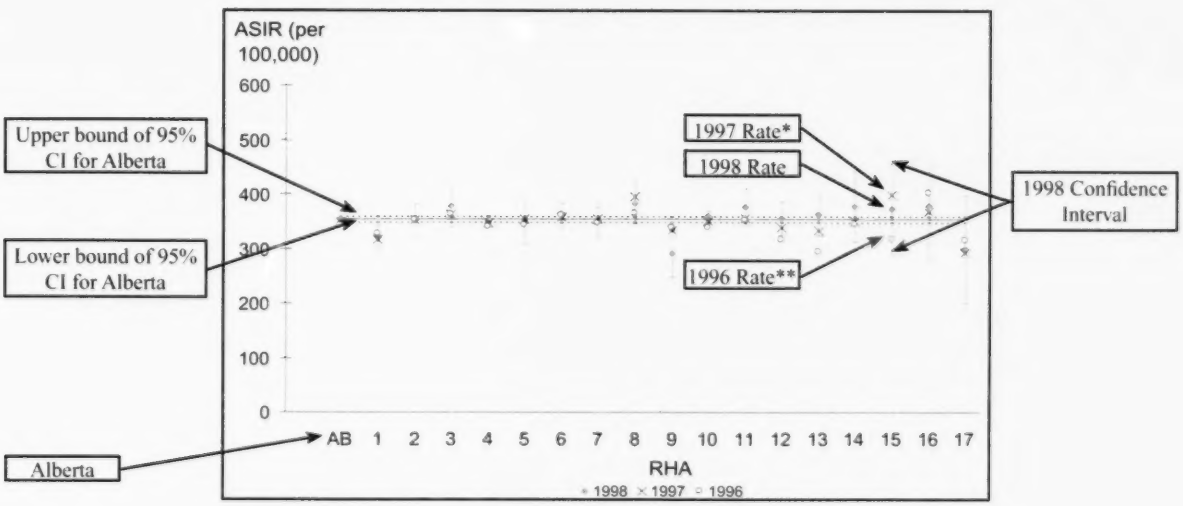
Age-Standardized Incidence and Mortality Rates by RHA

Age-standardized rates by RHA are presented for the last three years. In the figure below, the solid diamond (◆) represents the 1998 rate, the (×) symbol represents the 1997 rate and the open circle (○) represents the 1996 rate. As previously mentioned, each of these rates is based on a three year average. The bars extending from the solid diamond indicate the confidence interval for the most current year's rate (1998 rate in the example below). A confidence interval (CI) indicates the precision of an estimate. Confidence intervals are partly a function of the population size; as the population size increases, CIs narrow. Wide CIs indicate less precision and occur when the population size is smaller.

Note for example, the wider CIs for Regions 15, 16 and 17 in the graph below. These RHAs have relatively small populations. Rates from small populations are more prone to variation due to chance than large populations, and therefore produce wider confidence intervals. Consequently, the Alberta CI is narrower than those of the regions. The age-standardized rate for Alberta is dominated by the rates for RHA 4 (Calgary) and RHA 10 (Capital), which together represent two-thirds of the population of Alberta.

In order to evaluate the age-standardized rate of an RHA, note should be taken of the variability of the rates among the RHAs, as well as the width of the confidence interval. Age-standardized rates should be monitored over time.

Age-Standardized Incidence Rates (ASIR) by RHA with 95% Confidence Intervals (CIs) for All Invasive Cancers, Females, 1998 (average of 1997-1999)



* 1997 Rate is an average of 1996-1998
** 1996 Rate is an average of 1995-1997

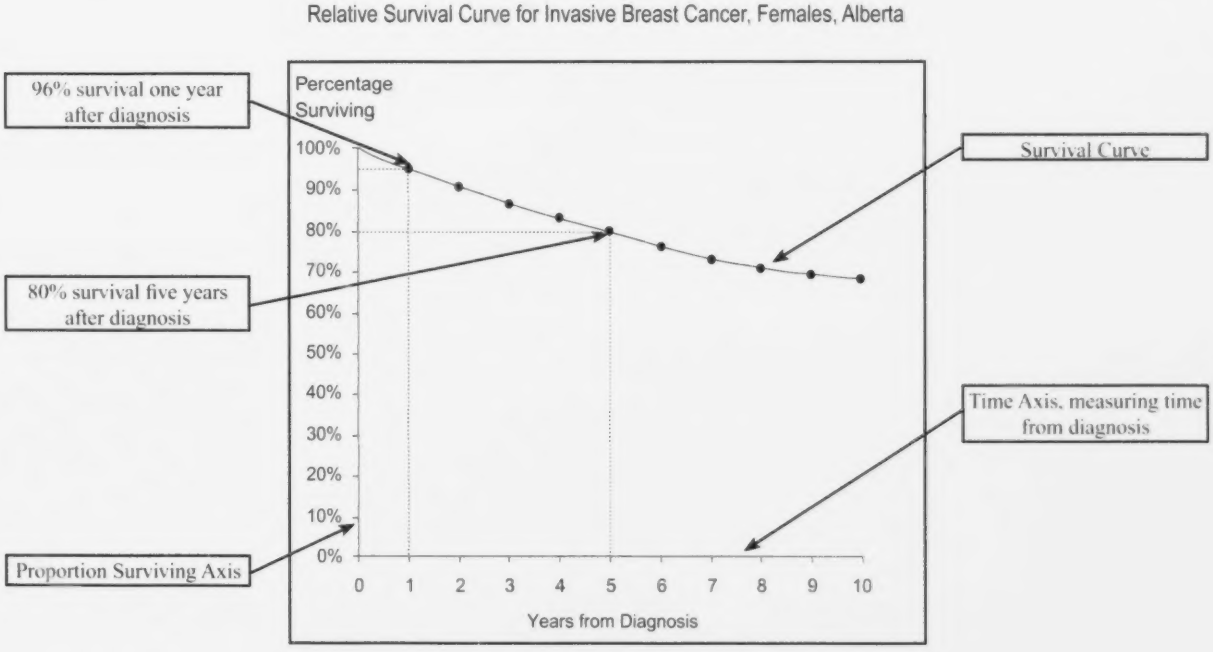
Survival Curves

Survival curves are used to describe the length of time from a diagnosis of cancer until death. The curves represent the percentage of people still alive after a period of time. For example, after one year, 96% of females diagnosed with breast cancer are still alive. After five years, 80% are still alive.

Survival curves can be used to compare survival outcomes between different groups (by sex, by cancer site, by cohort). The higher the survival curve, the better the survival rates for that cancer. Survival curves are presented in the first section - *All Cancers* and in the *Lung Cancer, Colorectal Cancer, Breast Cancer* and *Prostate Cancer* sections.

The site specific survival curves show the changes in survival over time. Survival curves for three cohorts - those diagnosed in 1985 - 1987, 1988 - 1990, and 1991 - 1993, are presented on the same plot for the purpose of evaluating improvements in survival over time.

All survival curves presented in this report were calculated using relative survival. This method compares mortality in cancer patients with mortality in the general population to obtain an estimate of cancer survival. For further details on relative survival, please refer to the *Technical Report* section (page 52).



Cancer in Alberta

A Regional Picture

Alberta

Data

THE BIGGER PICTURE - POPULATION

Alberta's population continues to grow - the population has increased by more than 34 per cent between 1980 and 1998. Alberta is divided into 17 RHAs identified by number and name as shown on the map on the next page. The populations of the RHAs vary dramatically. RHA 4, the largest RHA, has a population almost 50 times RHA 17, the smallest RHA. This population variation affects the precision of regional data presented in this report. The incidence and mortality data from the larger regions can be calculated with more precision than that of the smaller regions.

Alberta's population is also aging, thus the number of new cases and deaths from cancer is increasing because cancer is more likely to develop with age. The proportion of Alberta's population 65 years and older increased from approximately seven per cent in 1980 to 10 per cent in 1998. Over 55 per cent of new invasive cancers occur in this group, highlighting the importance of this age group in determining cancer burden.

Alberta and Its RHAs: Population and New Cases of Invasive Cancer 1998 (average of 1997-1999)

	Population		New Cases of Invasive Cancer				
	Total	% 65yrs & over	0-14 yrs	15-64 yrs	65+ yrs	Total	NMSC*
Alberta	2,848,022	10.0%	82	4490	5673	10245	4509
RHA 1	146,938	13.0%	3	207	391	601	352
RHA 2	88,563	12.9%	2	136	228	366	139
RHA 3	71,094	10.1%	4	117	148	269	129
RHA 4	887,009	8.9%	24	1418	1545	2987	1525
RHA 5	52,709	12.5%	2	79	128	209	98
RHA 6	177,471	11.1%	8	286	385	679	293
RHA 7	100,972	14.3%	2	159	296	457	204
RHA 8	89,179	7.4%	4	146	146	296	109
RHA 9	46,511	9.7%	2	59	79	140	53
RHA 10	803,240	10.5%	21	1315	1647	2983	1224
RHA 11	92,602	10.5%	2	155	198	355	106
RHA 12	96,423	11.7%	2	149	244	395	128
RHA 13	85,773	7.4%	2	122	128	252	84
RHA 14	25,185	9.6%	1	39	52	92	21
RHA 15	25,706	5.3%	1	31	26	58	14
RHA 16	39,464	1.9%	0	54	14	68	14
RHA 17	19,183	3.5%	2	16	11	29	8

*NMSC = Nonmelanoma skin cancer; these cases have not been included in the total

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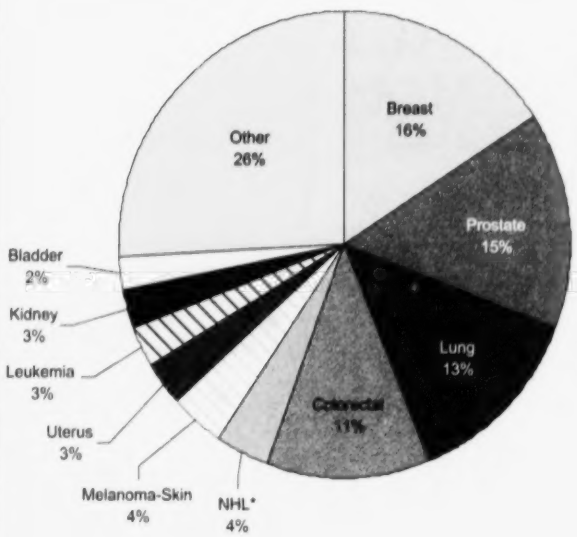
THE BIGGER PICTURE - RHA MAP

Alberta's Regional Health Authorities by Name and Number

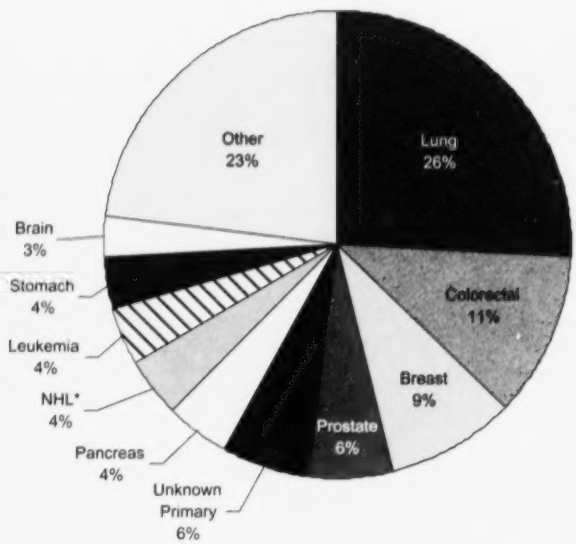
ALL CANCERS - DISTRIBUTION

New Invasive Cancers and Deaths by Site, Alberta, 1999

New Invasive Cancers by Site, Alberta, 1999



Cancer Deaths by Site, Alberta, 1999



There are over 200 different types of cancer. The most common invasive cancers are depicted in the pie charts above. As in previous years, the top four cancers in 1999 were breast, prostate, lung and colorectal. These four cancers were responsible for over 50 per cent of new cancers and cancer deaths in 1999. The *Other* category for new invasive cancers includes cancers that accounted for less than two per cent each of the total number of cancers, and the *Other* category for cancer deaths includes cancers that caused less than three per cent each of cancer deaths.

There are three cancers – pancreas, stomach and brain, that were responsible for 11 per cent of the deaths in 1999, but were not individually identified in the pie chart to the left because they each accounted for less than two per cent of the new cases. The reason for this difference is these cancers can have a poorer prognosis and have a greater relative contribution to the mortality figures than other cancers.

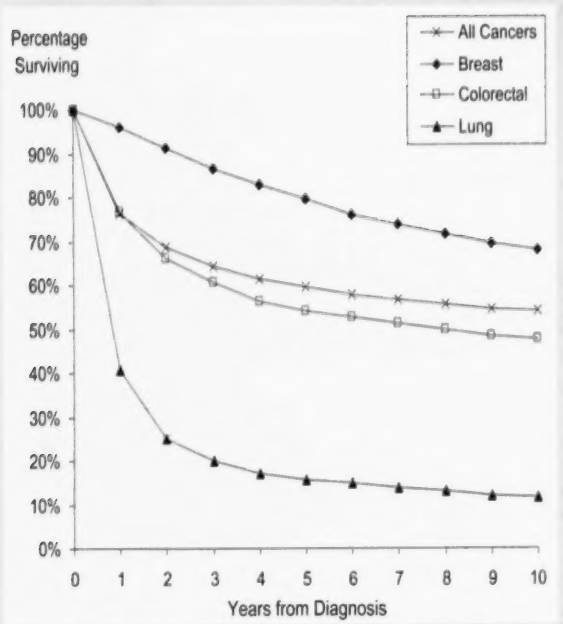
Even though it accounts for approximately 30 percent of malignant cancer cases diagnosed each year among Albertans, NMSC is not included in the charts in the rest of the report. Although these tumours are malignant, they are not typically life threatening and are usually successfully treated in doctors' offices without a pathology review.

*Non-Hodgkin Lymphoma

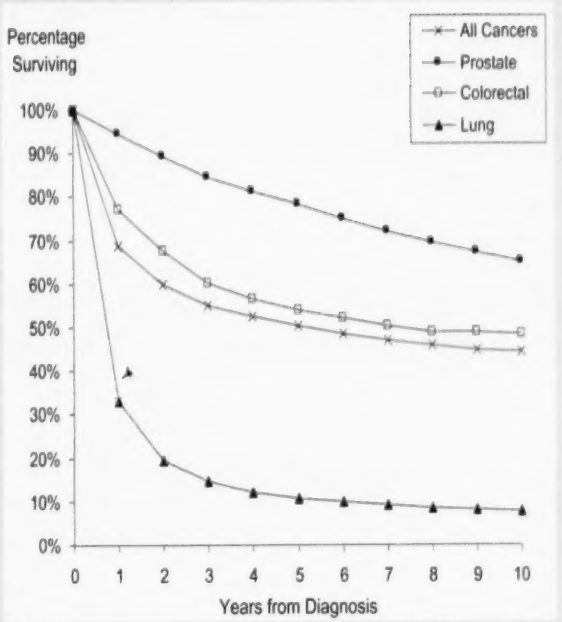
ALL CANCERS - SURVIVAL CURVES

Relative Survival Curves, Alberta (cases diagnosed 1985-1993)*

Female Cancers



Male Cancers



The number of years of survival after diagnosis of cancer depends on several factors. Survival is determined by site of the cancer, the stage of cancer at diagnosis, type of cells affected, age at diagnosis and treatment.

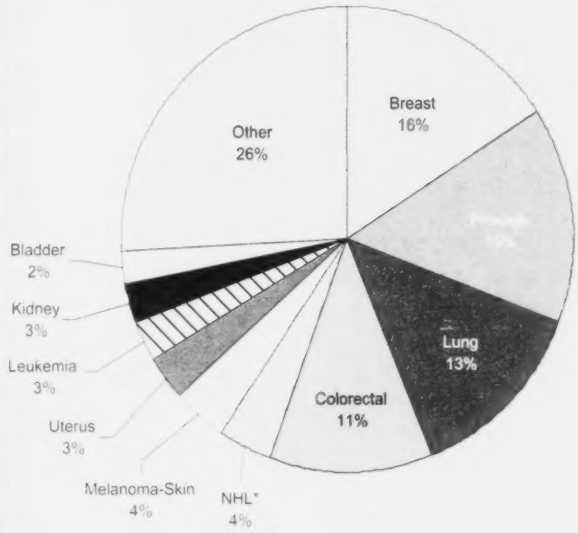
Survival after breast or prostate cancer decreases at a more constant rate than either that of lung or colorectal cancer. Five and ten year survival rates for breast and prostate cancers are better overall than for lung and colorectal cancers.

*Those cases not known to be dead were censored either at the date they left the province or December 21, 1999

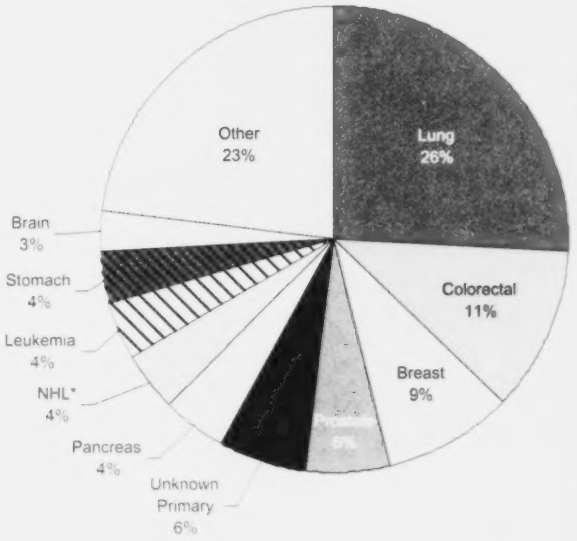
ALL CANCERS - DISTRIBUTION

New Invasive Cancers and Deaths by Site, Alberta, 1999

New Invasive Cancers by Site, Alberta, 1999



Cancer Deaths by Site, Alberta, 1999



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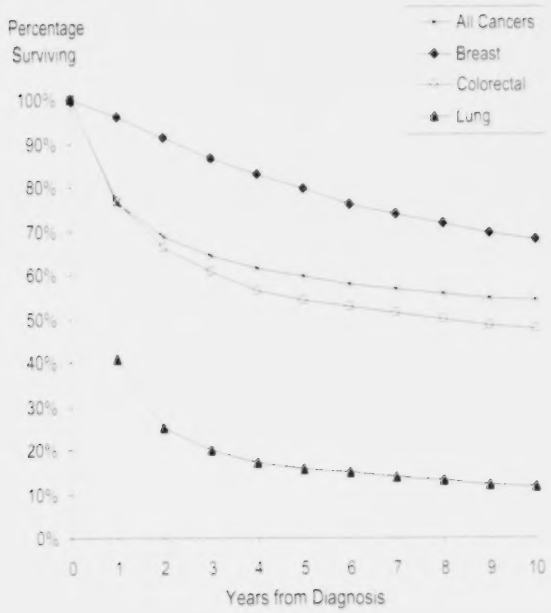
*Non-Hodgkin Lymphoma

ALL CANCERS - SURVIVAL CURVES

Relative Survival Curves, Alberta (cases diagnosed 1985-1993)*

Female Cancers



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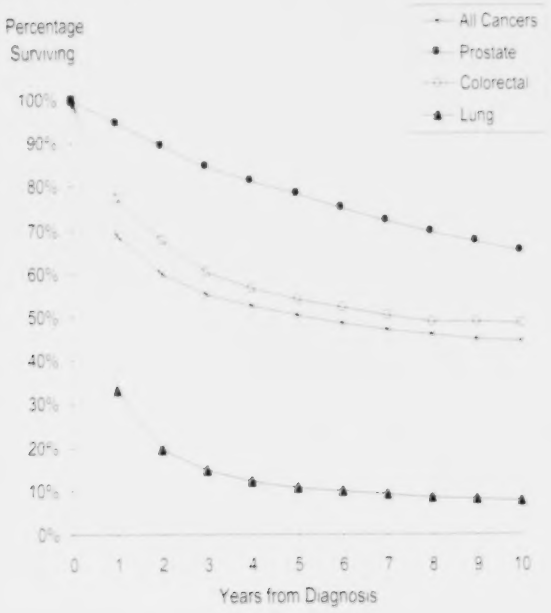

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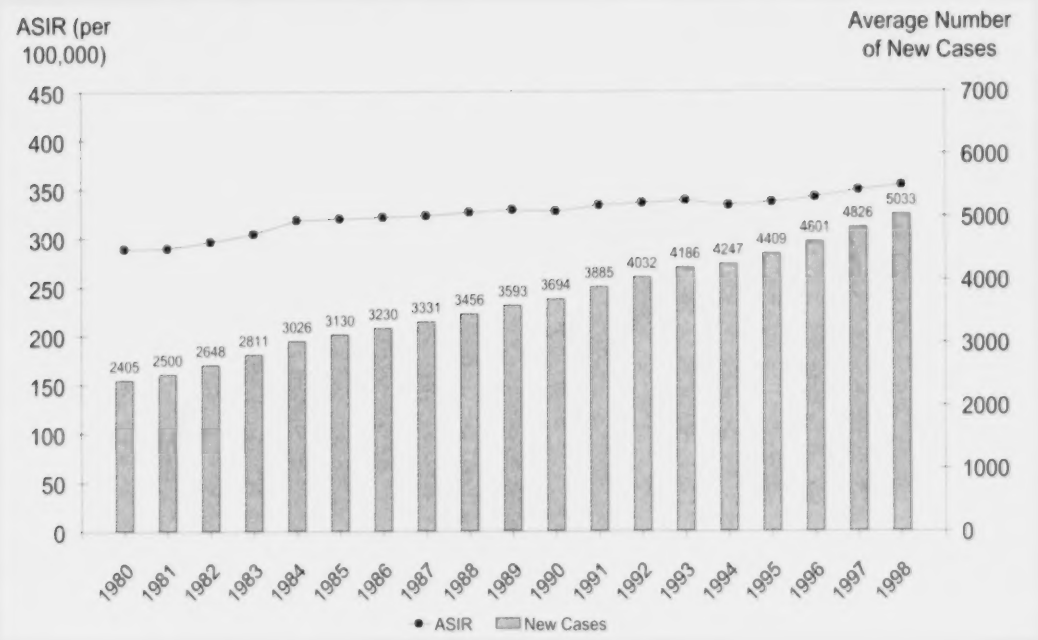
ALL CANCERS - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for All Invasive Cancers**, Females, Alberta (1980-1998)



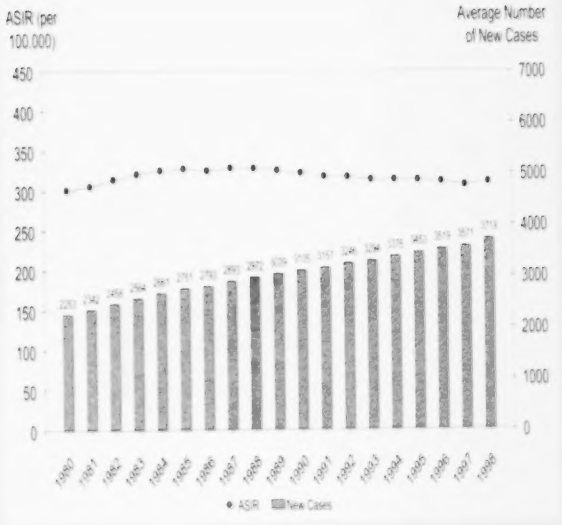
Age-standardized rates of cancer incidence in women have remained relatively stable since 1980, although a gradual increase is noticeable. Large increases in lung cancer have been offset by declining or stable rates for most other forms of cancer. The most common types of cancer in women are breast, lung and colorectal. The number of new cases is increasing due to an aging and growing population. The number of women with cancer has more than doubled over the past 18 years.

* Three-year averages age-standardized to the 1991 Canadian population
** Excluding Nonmelanoma Skin Cancer

Age-Standardized Incidence Rates (ASIR)* and New Cases for All Invasive Cancers**, Males, Alberta (1980-1998)

Including Prostate Cancer

Excluding Prostate Cancer



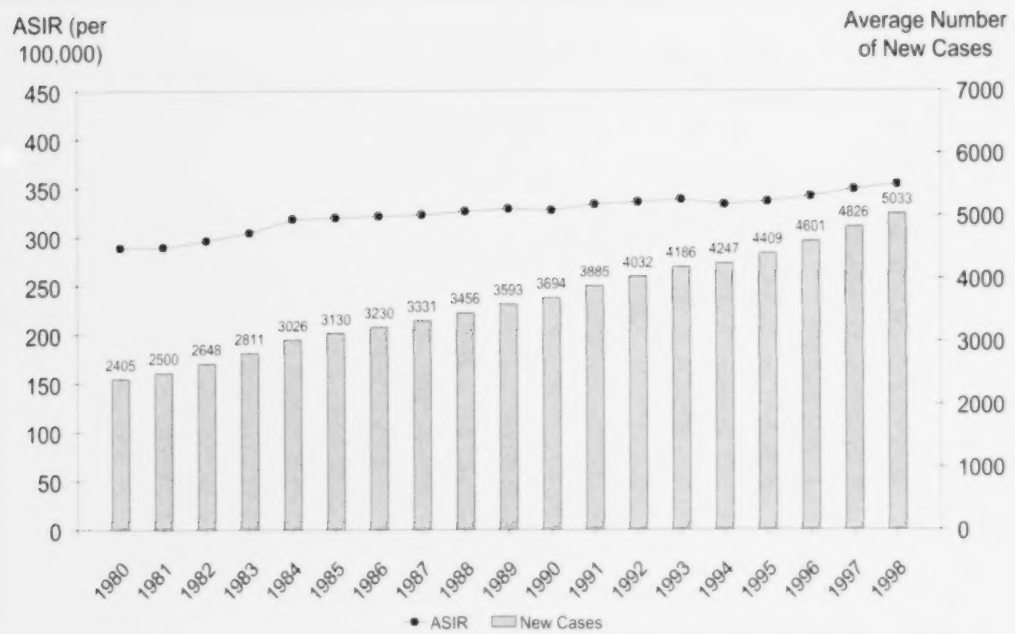
In order to understand overall trends better, prostate cancer has been excluded from the second graph above. Prostate cancer incidence rates were inflated by the introduction of PSA testing in the late 1980s, and its popularity in the early 1990s, and these high rates have a continued effect today on overall incidence rates. After prostate cancer, the second and third most common types of cancer in men are lung and colorectal.

Both graphs indicate that age-standardized rates of cancer incidence in men had declined in the late 1990s, but there is a slight indication of an increase for the last time period. The number of new cases continues to increase due to an aging and growing population. The actual number of cancer cases among men has increased by almost 90% since 1980.

* Three-year averages age-standardized to the 1991 Canadian population
** Excluding Nonmelanoma Skin Cancer

ALL CANCERS - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for All Invasive Cancers**, Females, Alberta (1980-1998)



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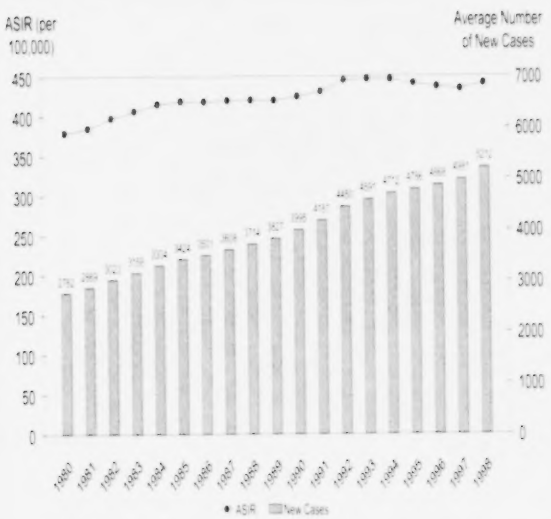
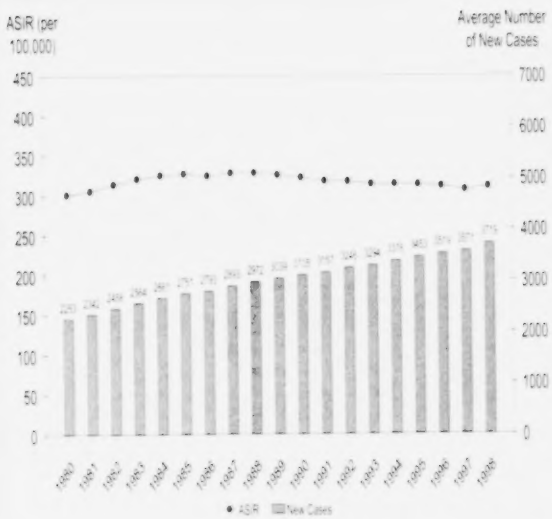
* Three-year averages age-standardized to the 1991 Canadian population
** Excluding Nonmelanoma Skin Cancer

Age-Standardized Incidence Rates (ASIR) and New Cases for All Invasive Cancers**, Males, Alberta (1980-1998)*

Including Prostate Cancer



Excluding Prostate Cancer



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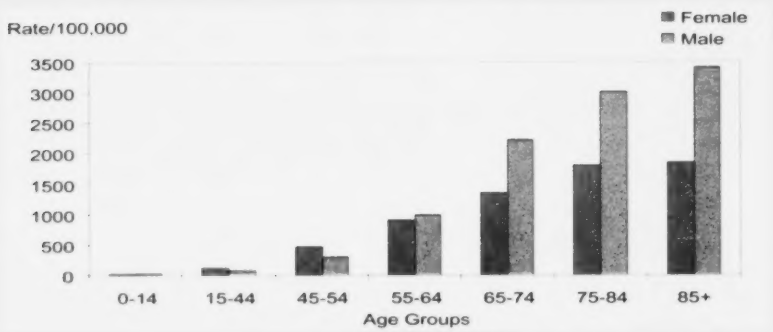
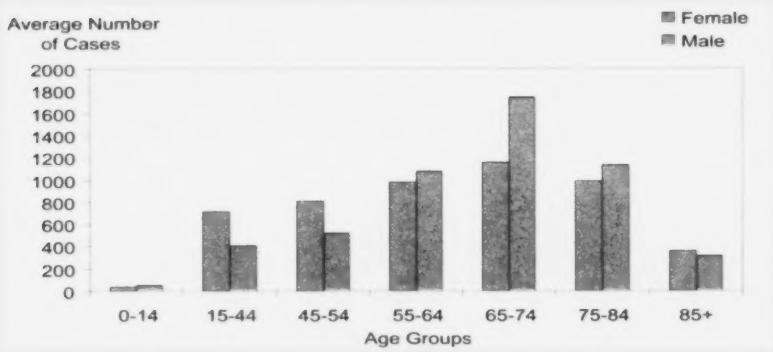
* Three-year averages age-standardized to the 1991 Canadian population
** Excluding Nonmelanoma Skin Cancer

Age-Specific Incidence Rates for All Invasive Cancers, Alberta, 1998 (average of 1997-1999)*



New Cases by Selected Age Groups for All Invasive Cancers, Alberta 1998 (average of 1997-1999)*

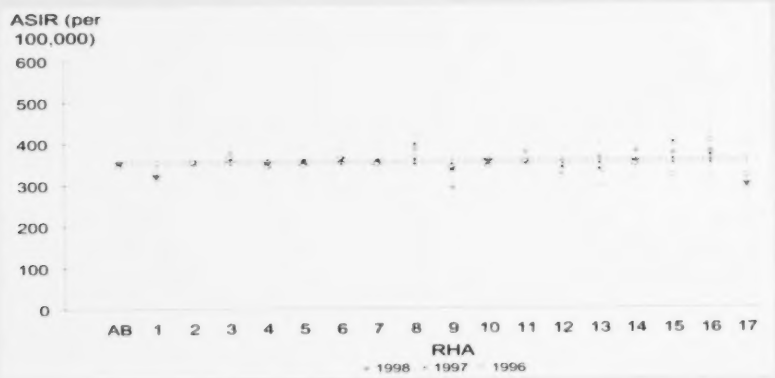


The age-specific incidence rates show a sharp increase with age, particularly in men. However, the number of new cancer cases drops off after age 75 for men and women. Note that the age-specific incidence rates are generally higher for men than for women after age 64, but the number of new cases in men age 75 and over are similar to women, as women tend to live longer than men and thus there are more women in these age groups.

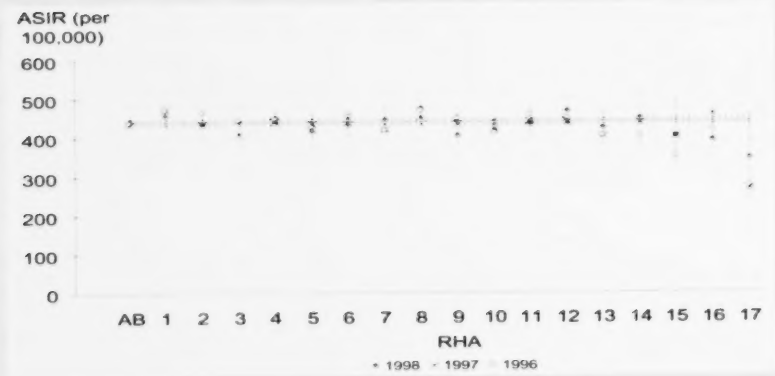
*Excluding Nonmelanoma Skin Cancer

Age-Standardized Incidence Rates (ASIR)* by RHA with 95% Confidence Intervals (CIs) for All Invasive Cancers**, 1998 (average of 1997-1999)

Females



Males



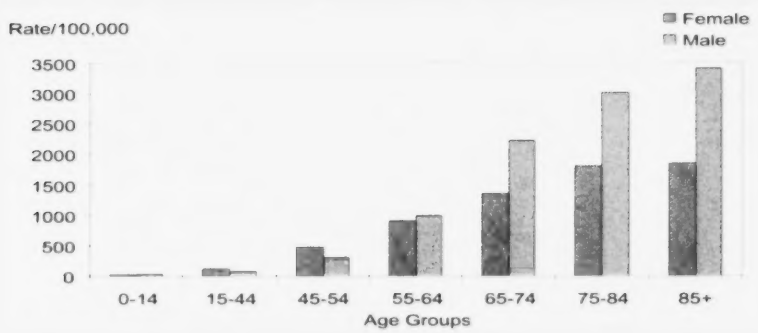
For females and males age-standardized incidence rates vary only slightly year-over-year for almost all RHAs, but the female age-standardized incidence rates tend to be lower than those for men.

There is some variation among RHAs (especially among RHAs with smaller populations), but even with three-year averages, small numbers may result in erratic estimates.

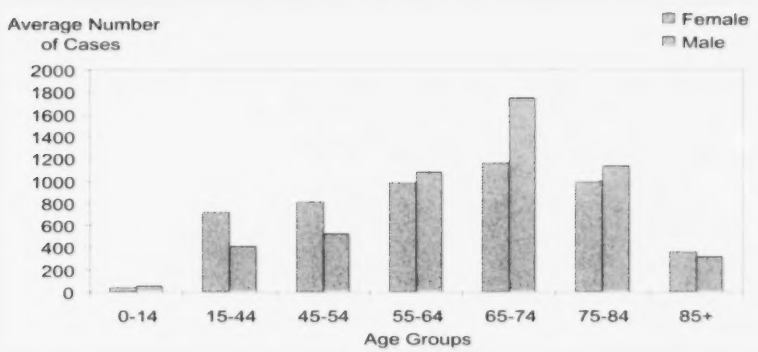
Note that the boundaries for several RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

* Three-year averages age-standardized to the 1991 Canadian population
** Excluding Nonmelanoma Skin Cancer

Age-Specific Incidence Rates for All Invasive Cancers, Alberta, 1998 (average of 1997-1999)*



New Cases by Selected Age Groups for All Invasive Cancers, Alberta 1998 (average of 1997-1999)*



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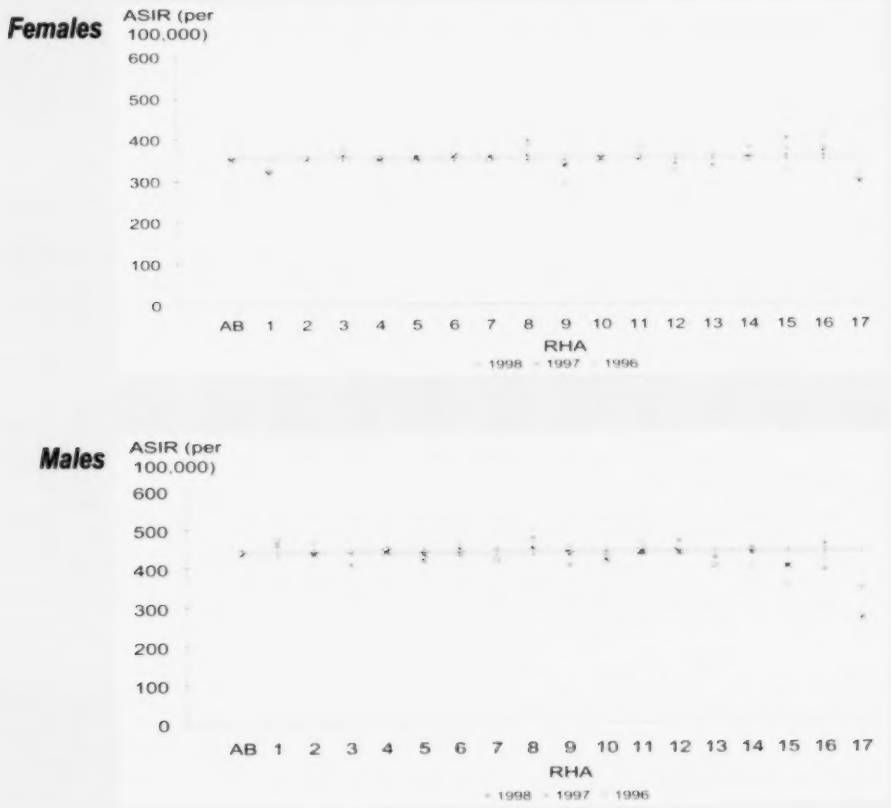

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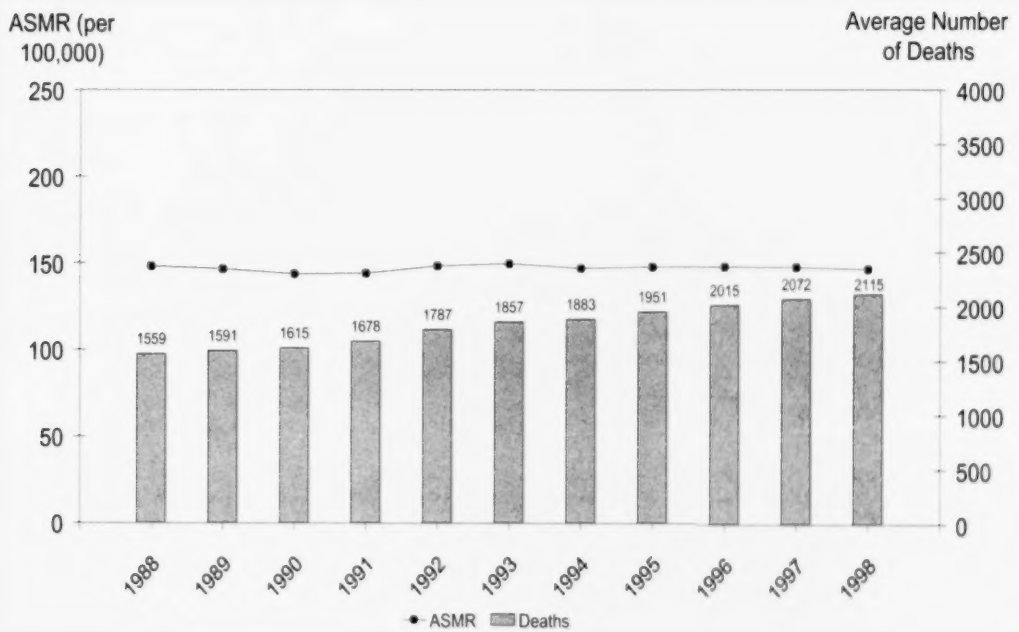
* Three-year averages age-standardized to the 1991 Canadian population
** Excluding Nonmelanoma Skin Cancer

ALL CANCERS - MORTALITY

Age-Standardized Mortality Rates (ASMR)* and the Number of Deaths for All Invasive Cancers, Females, Alberta (1988-1998)



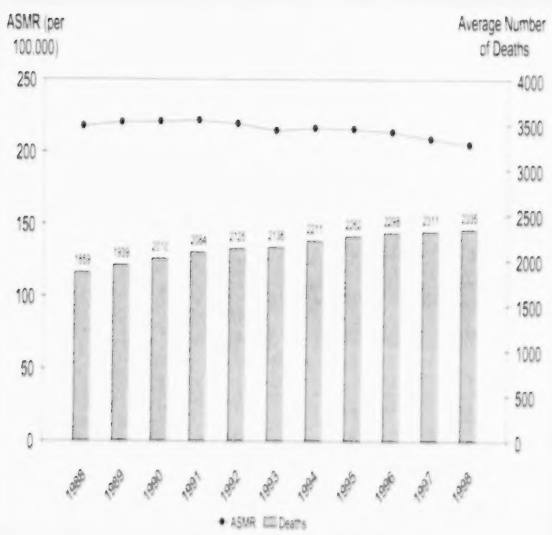
The cancer mortality rates in women have been relatively stable. As you will see later in this document, for women, large increases in lung cancer mortality rates have been offset by declining or stable rates for most other forms of cancer.

The overall increase in absolute numbers of deaths is attributable to the increase in population size and age in Alberta.

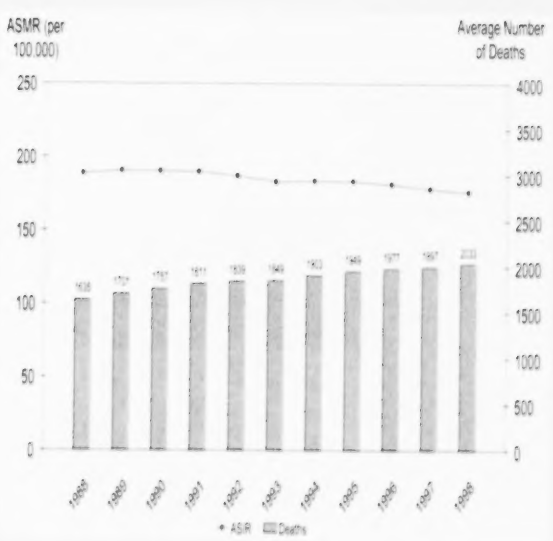
* Three-year averages age-standardized to the 1991 Canadian population

Age-Standardized Mortality Rates (ASMR) and the Number of Deaths for All Invasive Cancers, Males, Alberta (1988-1998)*

Including Prostate Cancer



Excluding Prostate Cancer



Mortality rates in men (including prostate cancer) have decreased slightly over the past 10 years. Prostate cancer accounted for approximately 13% of cancer deaths in men in 1998.

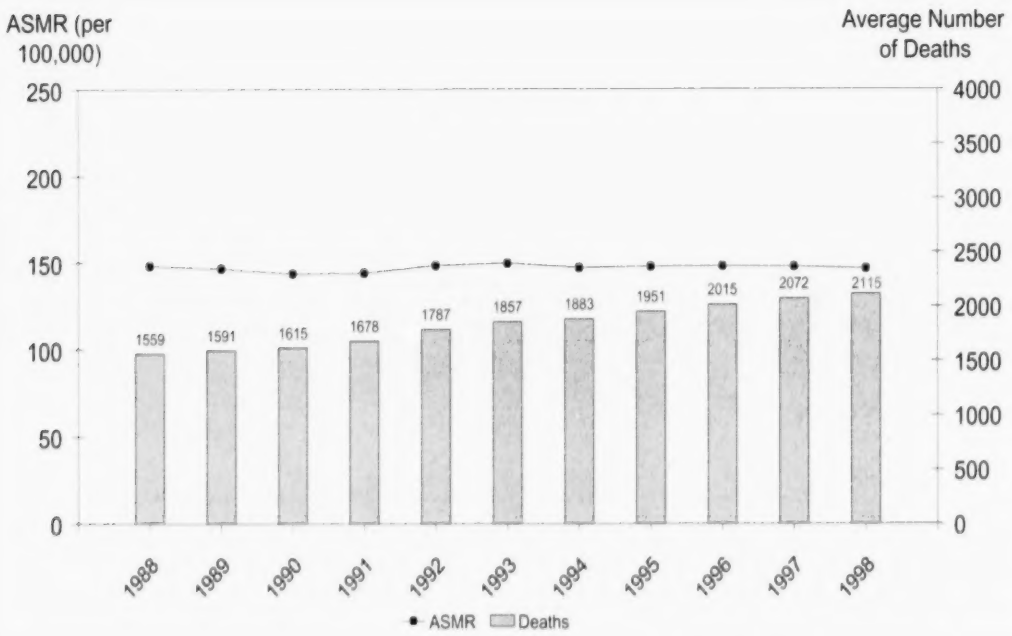
The increase in incidence rates of prostate cancer in the late 1980s and early 1990s has not been reflected in an increase in mortality rates due to prostate cancer. Hence the trends in both graphs above are similar.

For more information on prostate cancer and the effects of PSA testing, please refer to the *Prostate Cancer* section on page 32.

* Three-year averages age-standardized to the 1991 Canadian population

ALL CANCERS - MORTALITY

Age-Standardized Mortality Rates (ASMR)* and the Number of Deaths for All Invasive Cancers, Females, Alberta (1988-1998)



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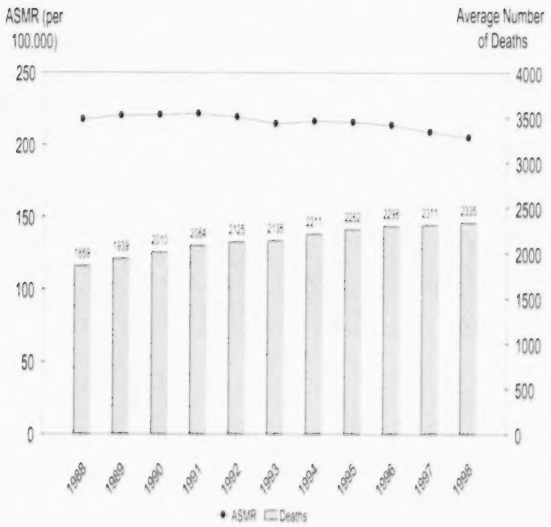
* Three-year averages age-standardized to the 1991 Canadian population

Age-Standardized Mortality Rates (ASMR) and the Number of Deaths for All Invasive Cancers, Males, Alberta (1988-1998)*

Including Prostate Cancer



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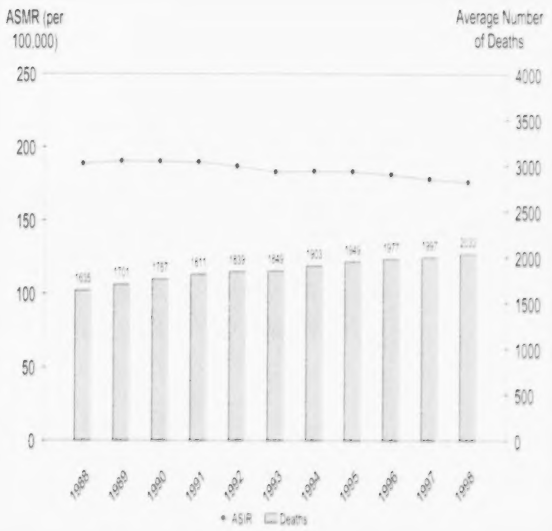

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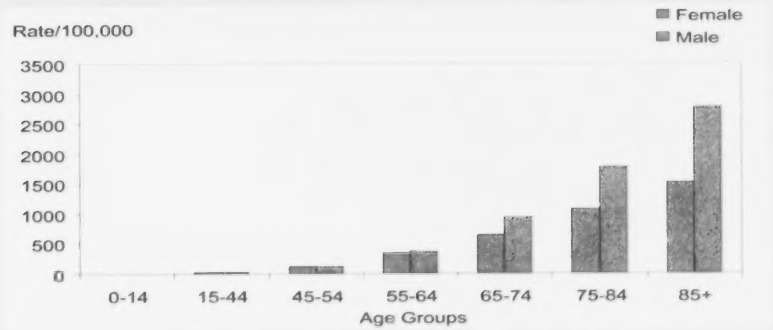
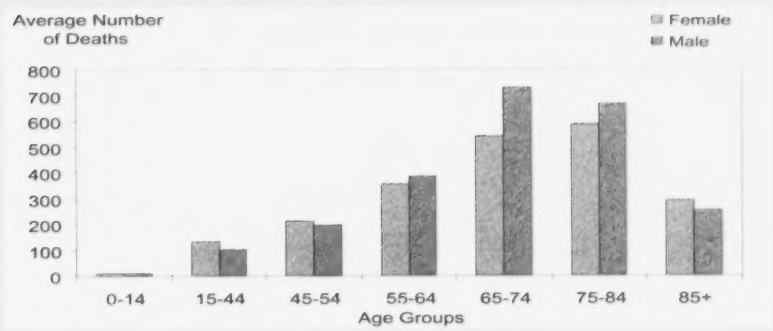
Age-Specific Mortality Rates for All Invasive Cancers, Alberta, 1998 (average of 1997-1999)



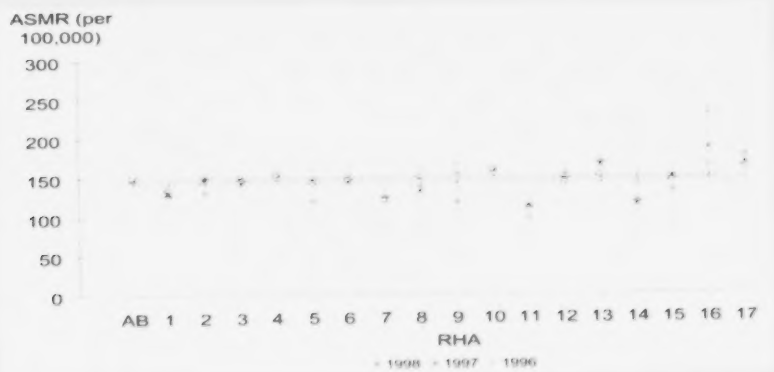
Number of Deaths by Selected Age Groups for All Invasive Cancers, Alberta, 1998 (average of 1997-1999)



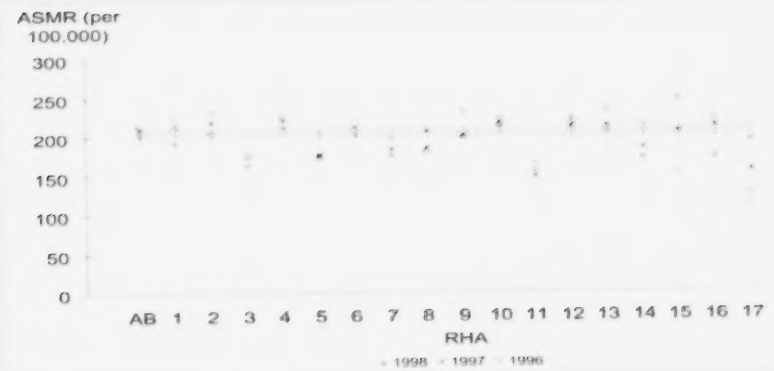
The age-specific mortality rates show a sharp increase with age, particularly in men. However, the number of cancer deaths drops off after age 75 for men and after age 85 for women. This is because there is a smaller population in the older age groups, as people die of other causes.

Age-Standardized Mortality Rates (ASMR)* by RHA with 95% Confidence Intervals, All Invasive Cancers, 1998 (average of 1997-1999)

Females



Males



Similar to cancer incidence, there is very little variation in cancer mortality among the RHAs or year-over-year for females. There is some variation among RHAs for males (especially among RHAs with smaller populations), but even with three-year averages, small numbers may result in erratic estimates. Patterns will be monitored to see if they continue over a number of years. The mortality rates for women tend to be lower than those for males.

Note that the boundaries for several RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

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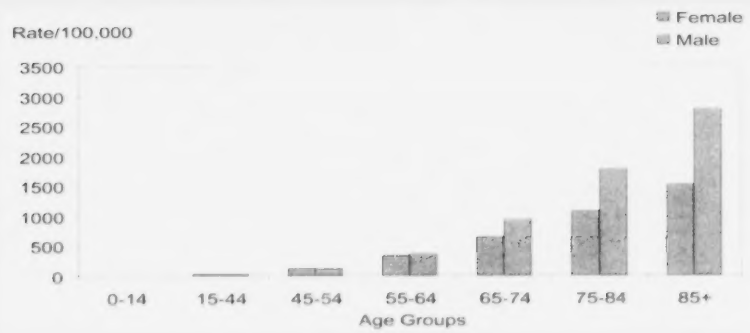

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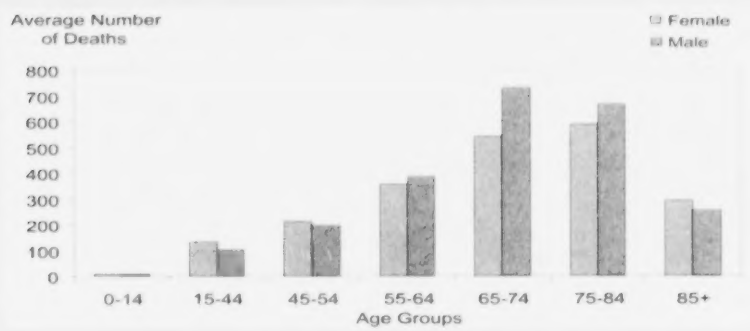

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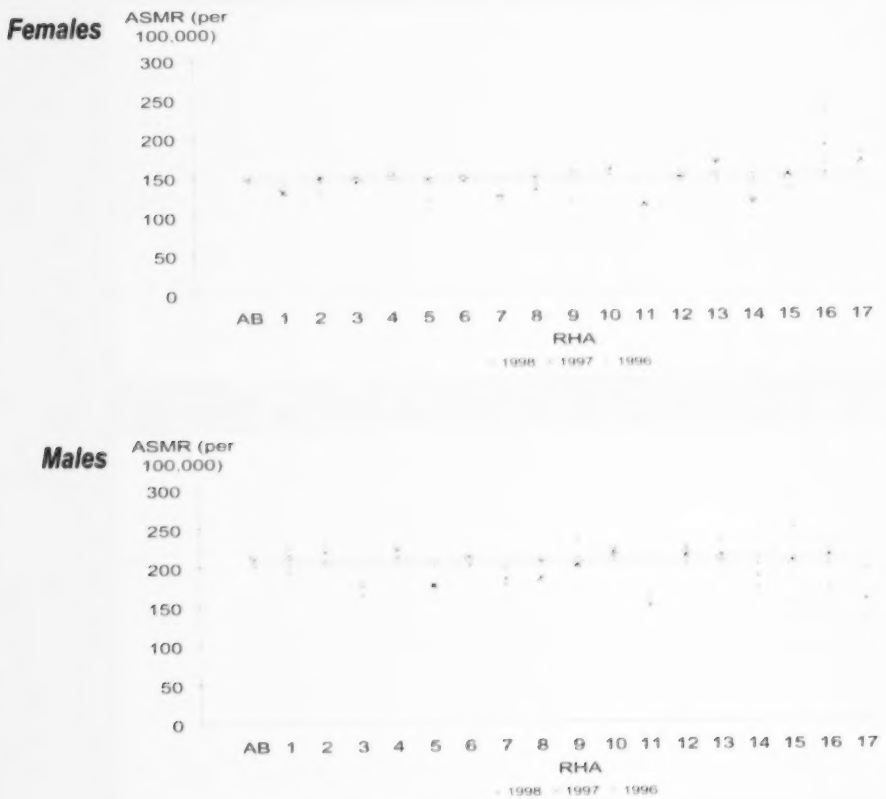


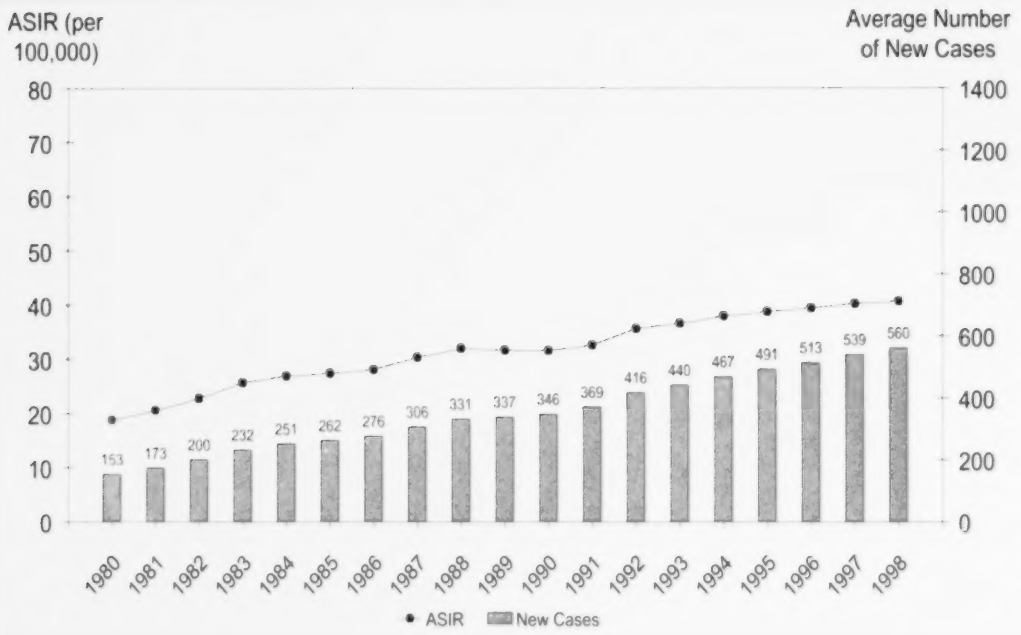
Similar to cancer incidence, there is very little variation in cancer mortality among the RHAs or year-over-year for females. There is some variation among RHAs for males (especially among RHAs with smaller populations), but even with three-year averages, small numbers may result in erratic estimates. Patterns will be monitored to see if they continue over a number of years. The mortality rates for women tend to be lower than those for males.

Note that the boundaries for several RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

* Three-year averages age-standardized to the 1991 Canadian population

LUNG CANCER - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for Invasive Lung Cancer, Females, Alberta (1980-1998)



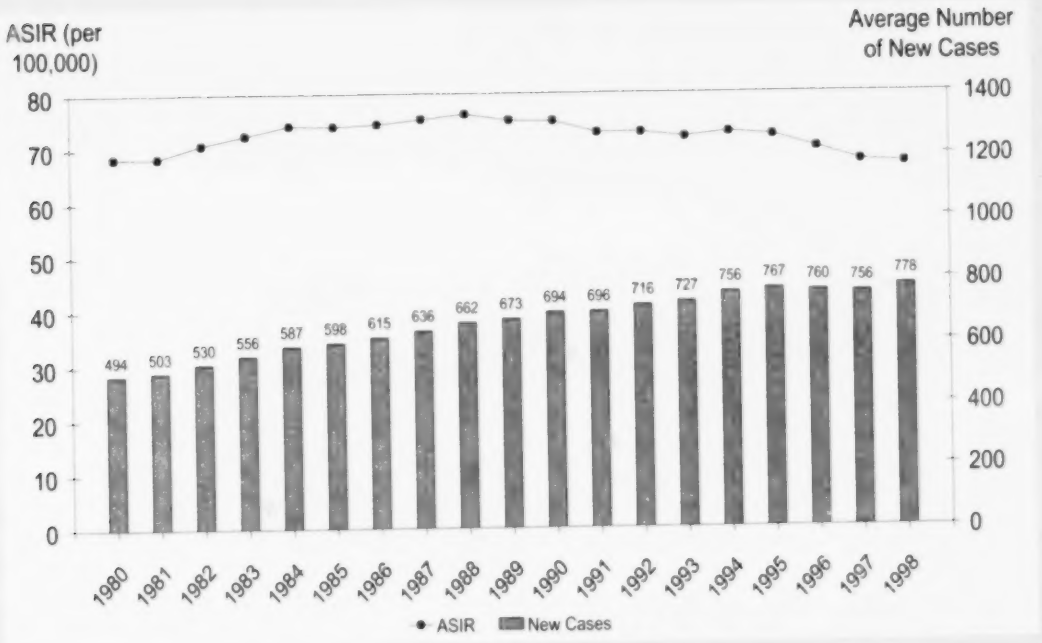
Lung cancer incidence rates in females have increased substantially over the last two decades. The number of female lung cancer cases in 1998 is 3.7 times higher than the number of cases in 1980. The rising trend in lung cancer incidence in females reflects their increase in smoking behavior 20 to 30 years ago.

Alberta women's rates of smoking peaked in the late 1960s at approximately 30% and remained relatively constant until the late 1970s. There has been a slight decline in smoking rates since then, with 25% of Alberta women smoking in 1999.** The constant increase in lung cancer incidence rates probably reflects an increasing trend in female smoking prior to the 1960s. Unfortunately there are no consistent smoking statistics available prior to 1966. Given the stabilization in the 1970s and the subsequent slight decline in smoking, the incidence rates may begin to stabilize in the future, however the large number of cases recorded for a preventable cancer is still cause for concern.

* Three-year averages age-standardized to the 1991 Canadian population

** Health Canada, Canadian Tobacco Use Monitoring Survey, (Ottawa, February - December 1999) Table 3.

Age-Standardized Incidence Rates (ASIR) and New Cases for Invasive Lung Cancer, Males, Alberta (1980-1998)*



The declining trend in lung cancer incidence in males reflects the decrease in smoking prevalence amongst males 20 to 30 years earlier. In 1966, 47% of Alberta males were smokers compared to 36% in 1979.** This decrease in smoking prevalence is reflected in the age-standardized incidence rates of lung cancer which dropped from 77 per 100,000 in 1988 to 67 per 100,000 in 1998. Smoking prevalence rates have dropped further, down to 27% in 1999, and this decrease should be reflected in falling lung cancer incidence rates in the years to come. Unfortunately, the impact of reduced rates is being counterbalanced by the influence of a larger aging population resulting in a steady number of cancer cases.

Although there have been large declines in male lung cancer incidence rates recently, the number of cases and the rates are still substantially higher than in women.

* Three-year averages age-standardized to the 1991 Canadian population
** Health and Welfare Canada, *Smoking Habits of Canadians 1965-1979* (Ottawa, 1980) 20.

LUNG CANCER - INCIDENCE

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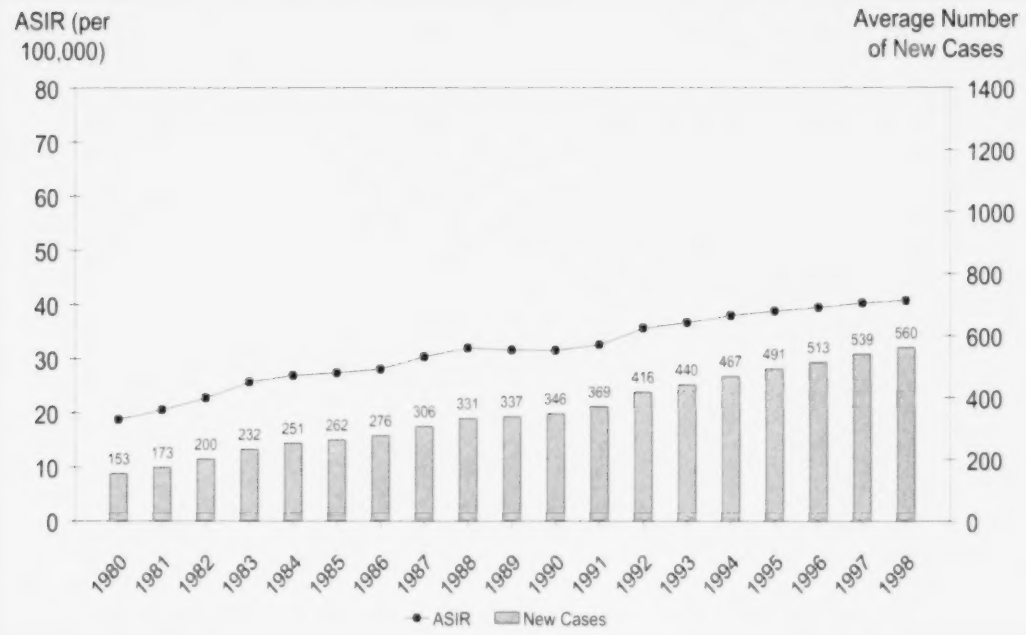

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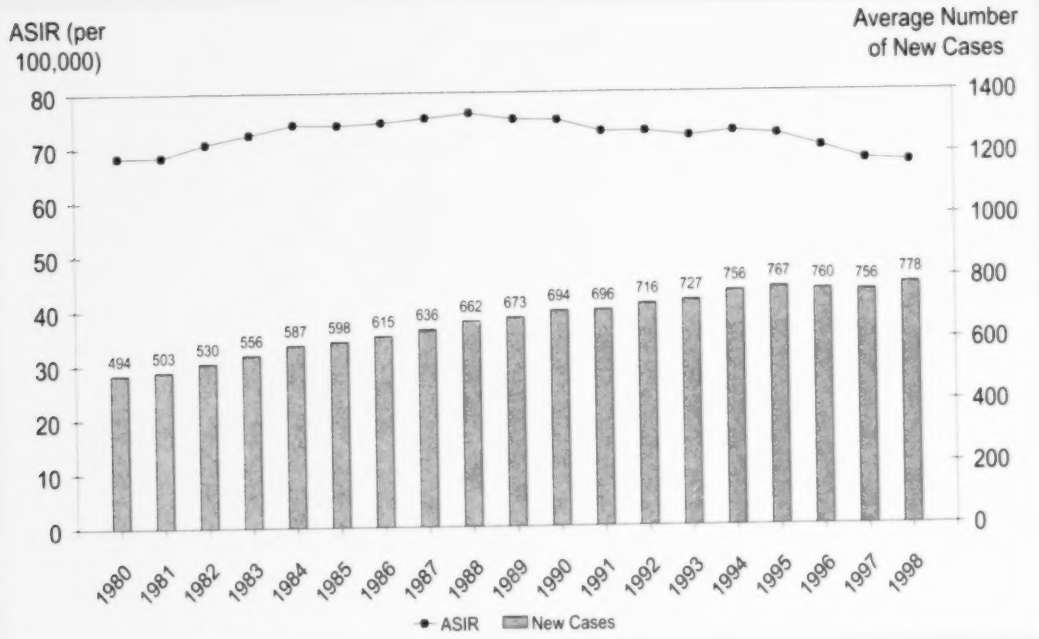

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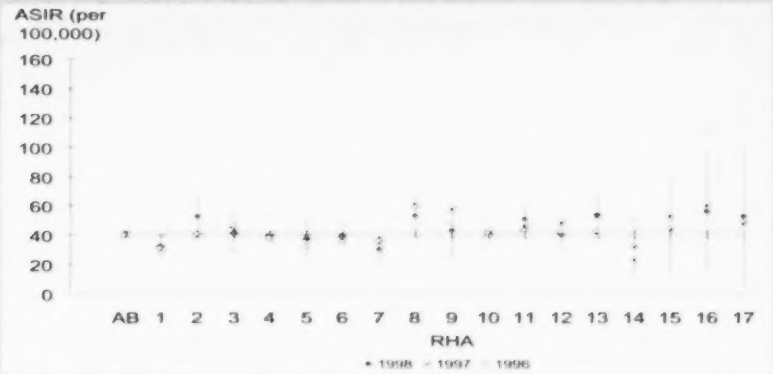
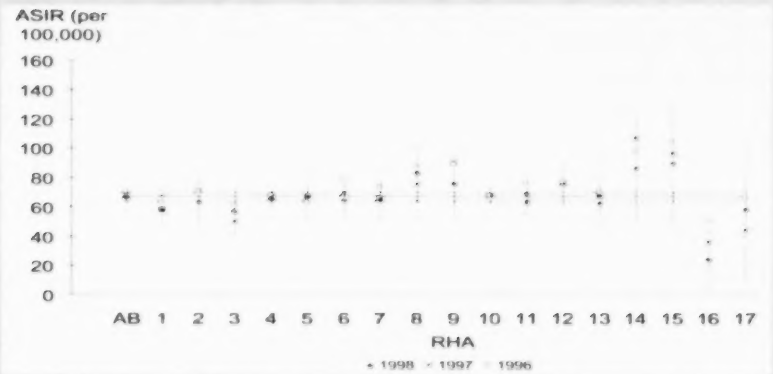
** Health and Welfare Canada, *Smoking Habits of Canadians 1965-1979* (Ottawa, 1980) 20.

Age-Standardized Incidence Rates (ASIR)* by RHA with 95% Confidence Intervals for Invasive Lung Cancer, 1998 (average of 1997-1999)

Females



Males



There is variability in lung cancer incidence rates among the smaller RHAs, but note the large confidence intervals. Since lung cancer incidence is related to smoking patterns, the variation of rates may be a reflection of past smoking patterns.

In general there is a small year-over-year variation in the RHA specific rates.

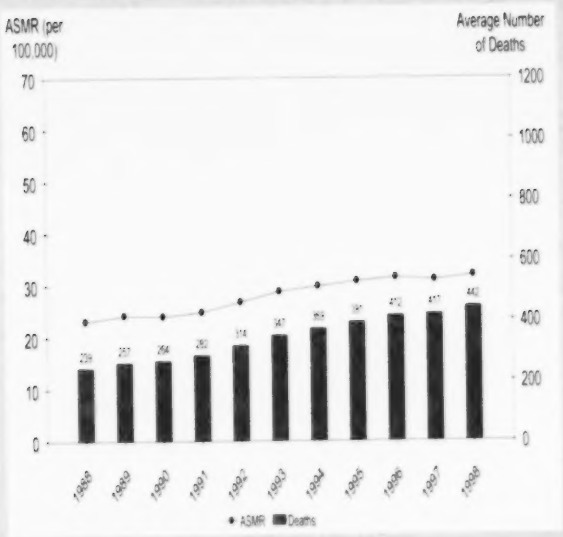
Note that the boundaries for several RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

* Three-year averages age-standardized to the 1991 Canadian population

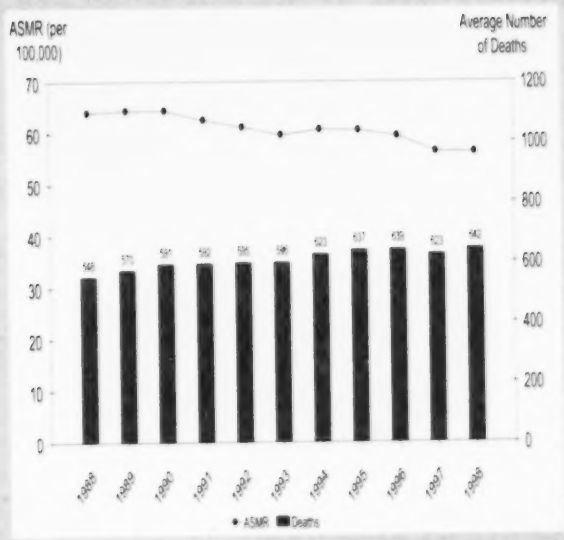
LUNG CANCER - MORTALITY

Age-Standardized Mortality Rates (ASMR)* and the Number of Deaths for Invasive Lung Cancer, Alberta (1988-1998)

Females



Males



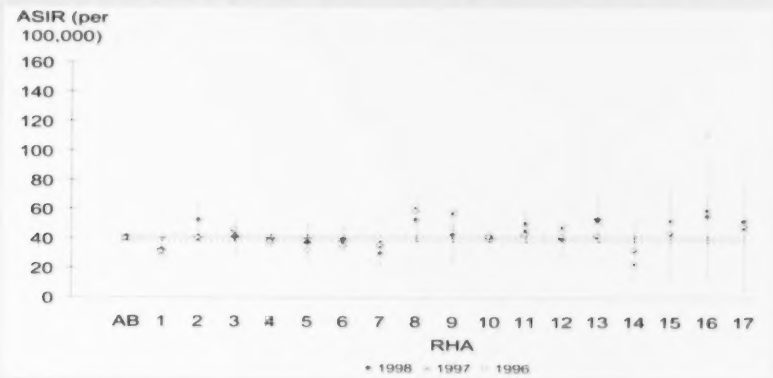
The mortality trends for lung cancer for both females and males are very similar to their corresponding incidence trends. Lung cancer still has a high death rate; therefore the number of deaths per year is almost as high as the number of new cases. Note that even though male mortality rates are falling they are still higher than female mortality rates.

Since 1994, lung cancer has accounted for more deaths every year in Alberta women than breast cancer.

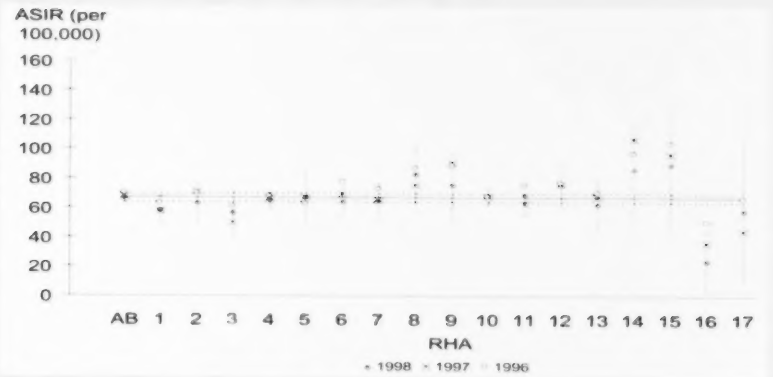
* Three-year averages age-standardized to the 1991 Canadian population

Age-Standardized Incidence Rates (ASIR)* by RHA with 95% Confidence Intervals for Invasive Lung Cancer, 1998 (average of 1997-1999)

Females



Males



There is variability in lung cancer incidence rates among the smaller RHAs, but note the large confidence intervals. Since lung cancer incidence is related to smoking patterns, the variation of rates may be a reflection of past smoking patterns.

In general there is a small year-over-year variation in the RHA specific rates.

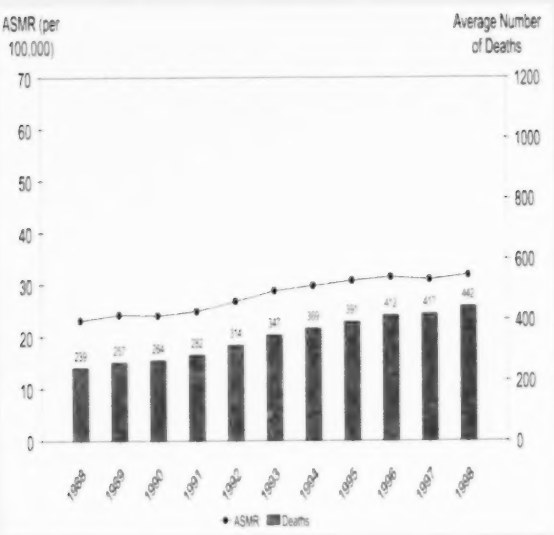
Note that the boundaries for several RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

* Three-year averages age-standardized to the 1991 Canadian population

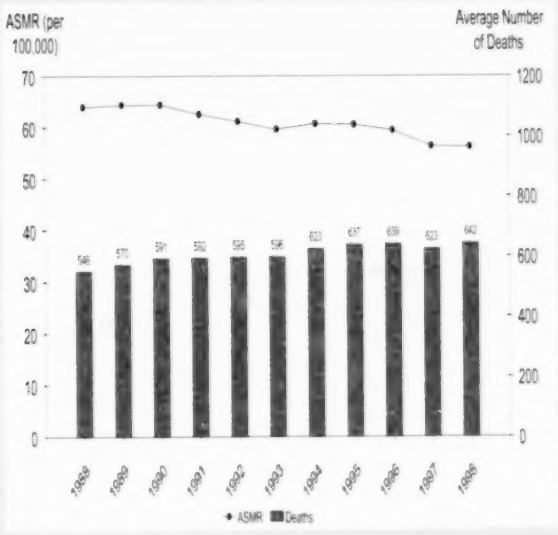
LUNG CANCER - MORTALITY

Age-Standardized Mortality Rates (ASMR)* and the Number of Deaths for Invasive Lung Cancer, Alberta (1988-1998)

Females



Males



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Since 1994, lung cancer has accounted for more deaths every year in Alberta women than breast cancer.

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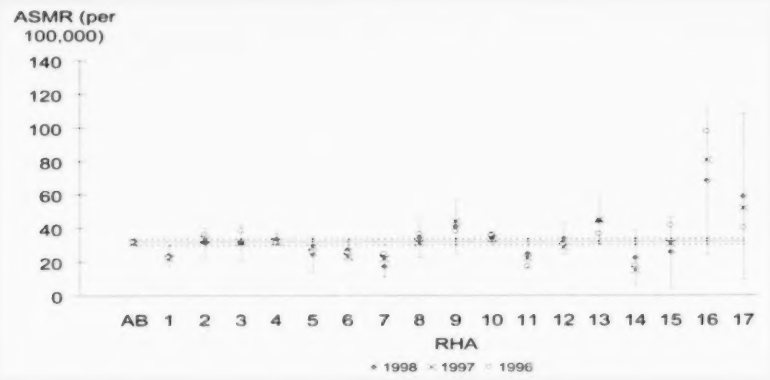
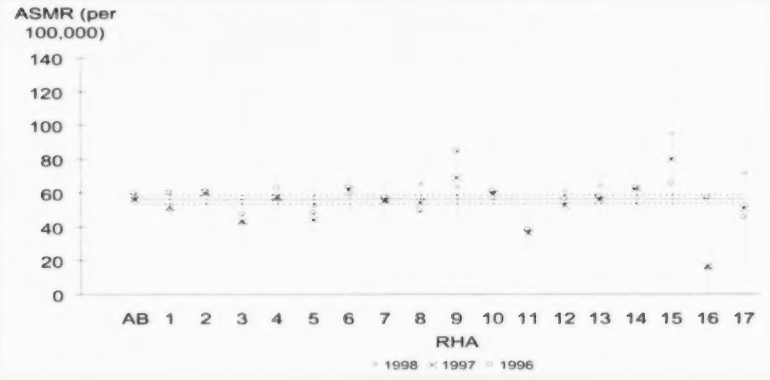
Age-Standardized Mortality Rates (ASMR) by RHA with 95% Confidence Intervals for Invasive Lung Cancer, 1998 (average of 1997-1999)*

Females



Males



The patterns of the RHA age-standardized mortality rates for lung cancer are similar to the age-standardized incidence patterns.

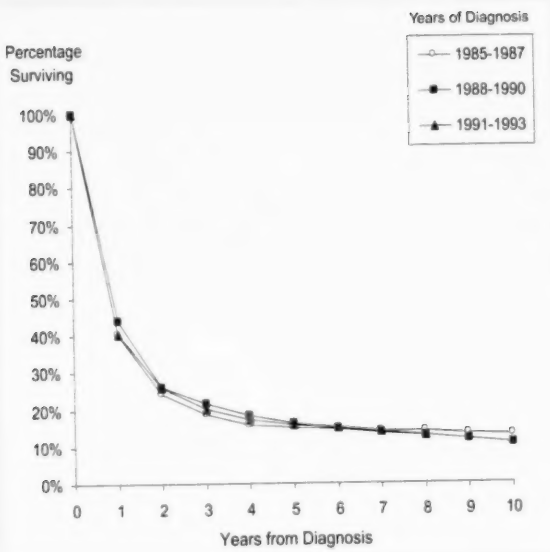
Note that the boundaries for sever' RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

* Three-year averages age-standardized to the 1991 Canadian population

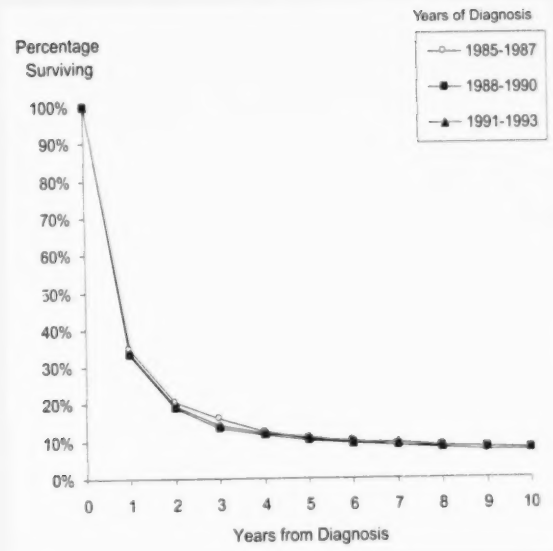
LUNG CANCER - SURVIVAL CURVES

Relative Survival Curves for Invasive Lung Cancer, Alberta (cases diagnosed 1985-1993)

Females

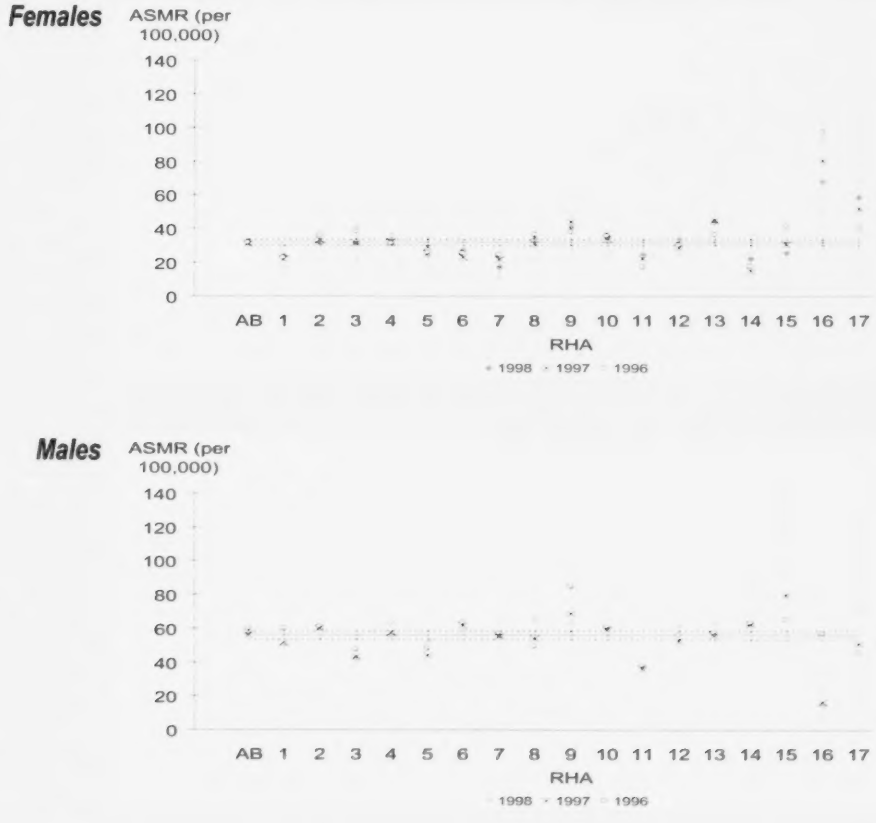


Males



Survival for females (16% at five years) is somewhat better than for males (11% at five years). Unfortunately there has not been significant improvement in survival after diagnosis of lung cancer over the nine years shown here.

Age-Standardized Mortality Rates (ASMR) by RHA with 95% Confidence Intervals for Invasive Lung Cancer, 1998 (average of 1997-1999)*



The patterns of the RHA age-standardized mortality rates for lung cancer are similar to the age-standardized incidence patterns.

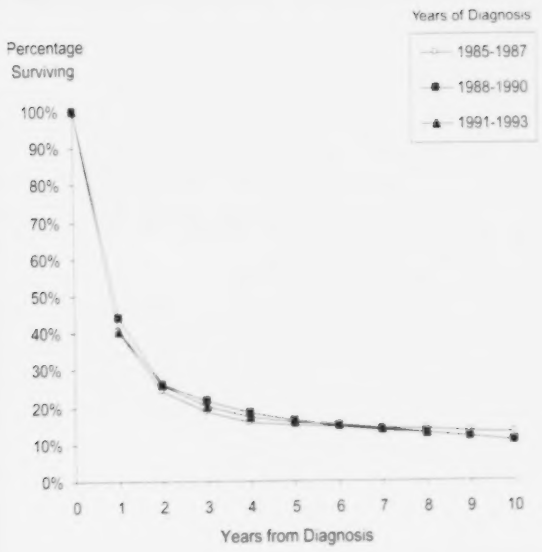
Note that the boundaries for several RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

* Three-year averages age-standardized to the 1991 Canadian population

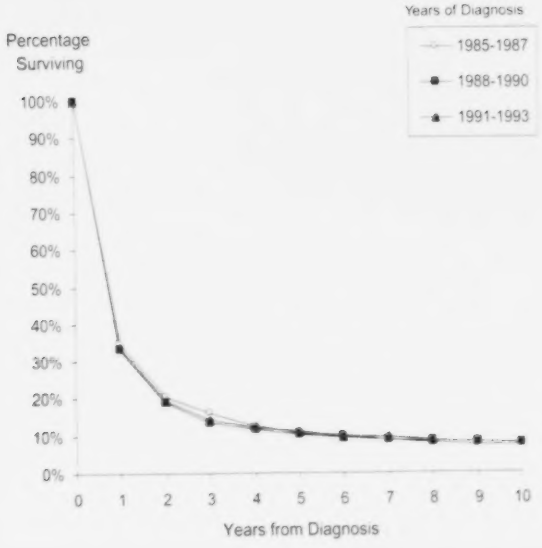
LUNG CANCER - SURVIVAL CURVES

Relative Survival Curves for Invasive Lung Cancer, Alberta (cases diagnosed 1985-1993)

Females



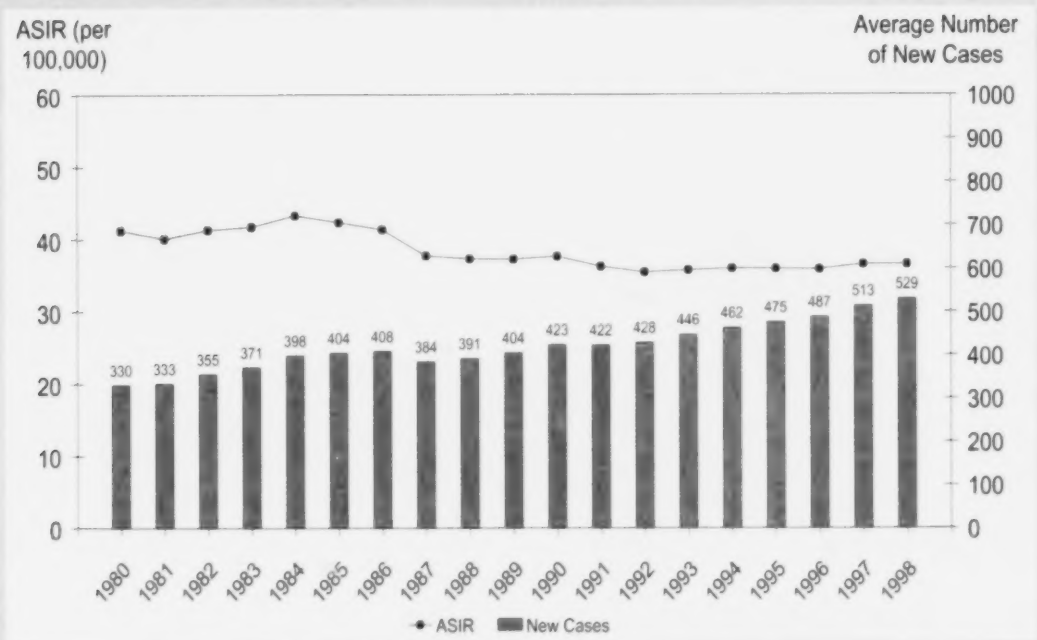
Males



Survival for females (16% at five years) is somewhat better than for males (11% at five years). Unfortunately there has not been significant improvement in survival after diagnosis of lung cancer over the nine years shown here.

COLORECTAL CANCER - INCIDENCE

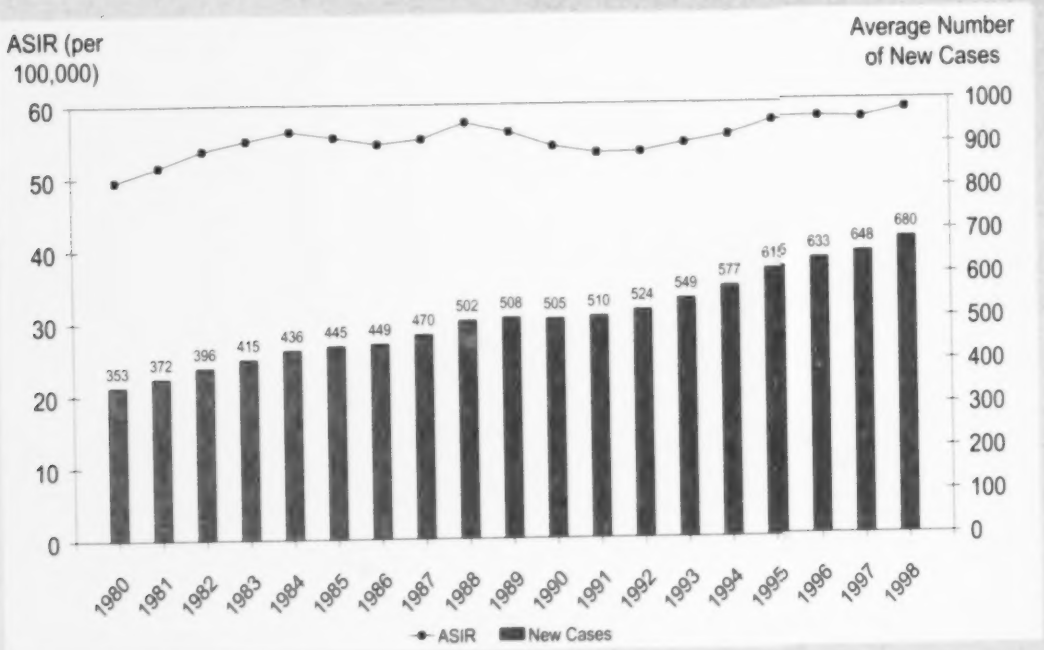
Age-Standardized Incidence Rates (ASIR)* and New Cases for Invasive Colorectal Cancer, Females, Alberta (1980-1998)



The age-standardized incidence rates for colorectal cancer in females show a gradual downward trend between 1980 and 1992 and remain relatively stable thereafter. The reasons for changes in trends in colorectal cancer incidence are not well understood, but some evidence suggests that lifestyle changes such as diet may have contributed to the decline.

* Three-year averages age-standardized to the 1991 Canadian population

Age-Standardized Incidence Rates (ASIR)* and New Cases for Invasive Colorectal Cancer, Males, Alberta (1980-1998)

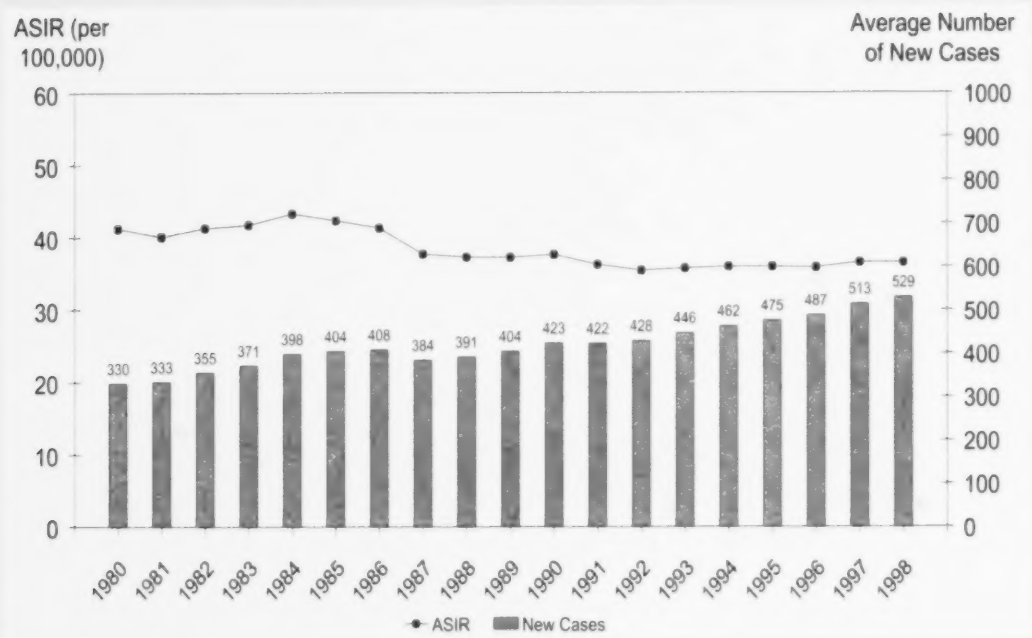


The age-standardized incidence rates for colorectal cancer in males did not show the same downward trend as female rates between 1980 and 1998, although male rates have been fairly stable since 1995. The reasons for the difference between male and female rates are not well understood.

* Three-year averages age-standardized to the 1991 Canadian population

COLORECTAL CANCER - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for Invasive Colorectal Cancer, Females, Alberta (1980-1998)



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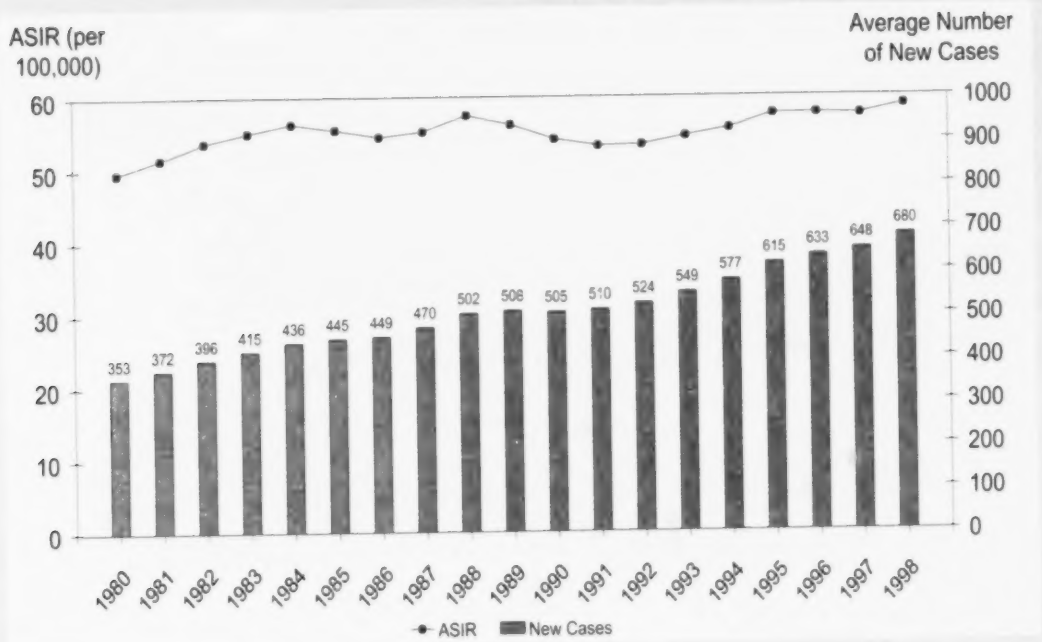
* Three-year averages age-standardized to the 1991 Canadian population

Age-Standardized Incidence Rates (ASIR) and New Cases for Invasive Colorectal Cancer, Males, Alberta (1980-1998)*

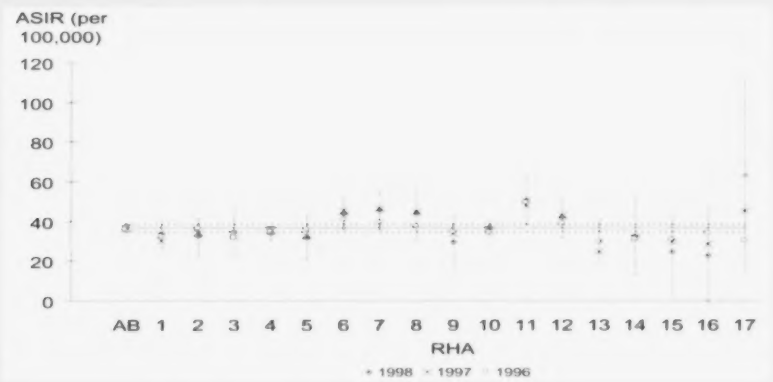


The age-standardized incidence rates for colorectal cancer in males did not show the same downward trend as female rates between 1980 and 1998, although male rates have been fairly stable since 1995. The reasons for the difference between male and female rates are not well understood.

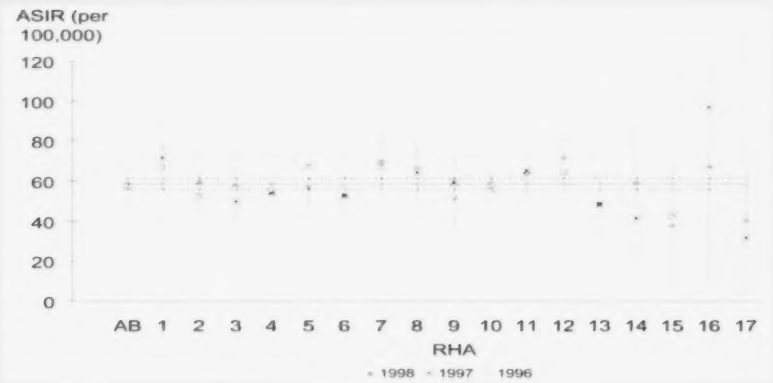
* Three-year averages age-standardized to the 1991 Canadian population

Age-Standardized Incidence Rates (ASIR)* by RHA with 95% Confidence Intervals for Invasive Colorectal Cancer, 1998 (average of 1997-1999)

Females



Males



Female rates for colorectal cancer are quite comparable across RHAs, while the rates for males are more variable and in general higher than females. Note that all confidence intervals include the provincial average.

In general there is little year-over-year variation in the RHA specific rates.

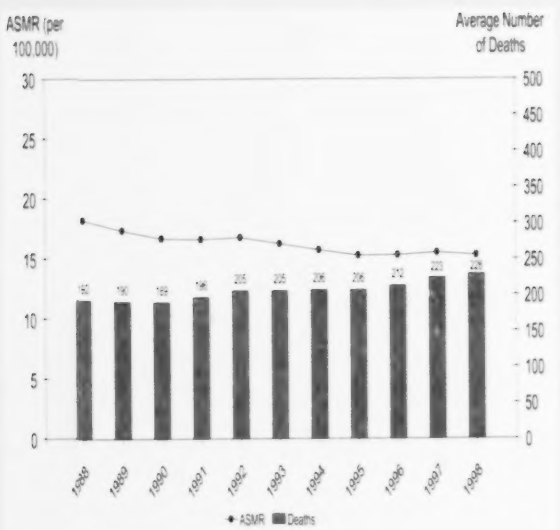
Note that the boundaries for several RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

* Three-year averages age-standardized to the 1991 Canadian population

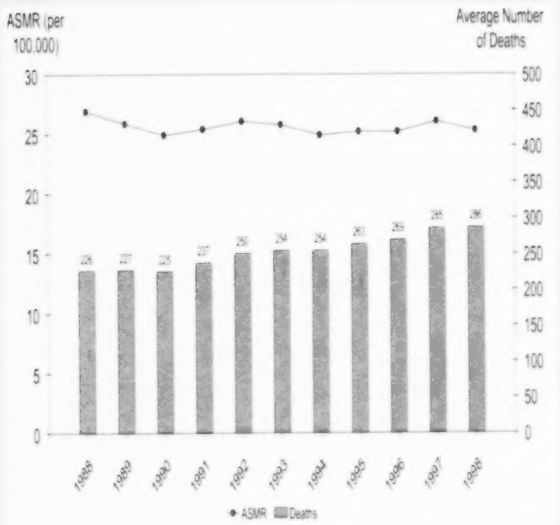
COLORECTAL CANCER - MORTALITY

Age-Standardized Mortality Rates (ASMR)* and the Number of Deaths for Invasive Colorectal Cancer, Alberta (1988-1998)

Females



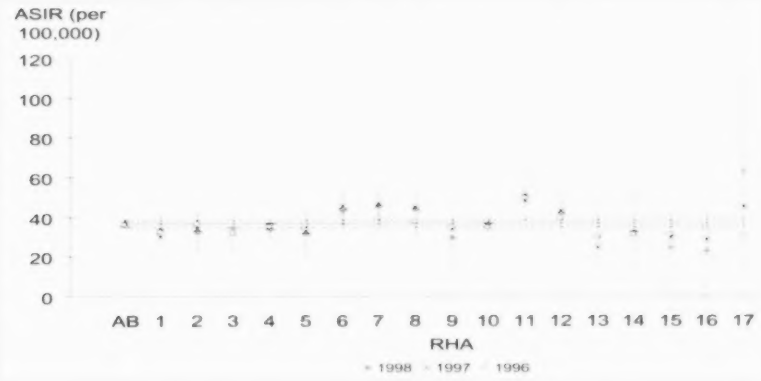
Males

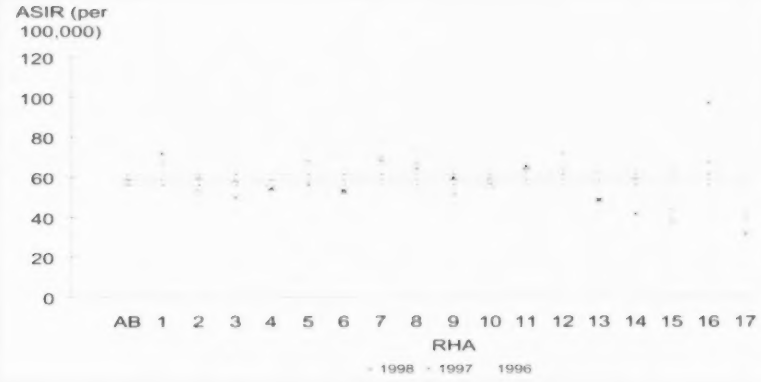


Female age-standardized mortality rates reflect the pattern of female incidence rates, whereas male mortality rates have fluctuated over the time period. Male mortality rates continue to be higher than female rates. The number of deaths that occur in a given year is approximately 45% of the number of new cases.

* Three-year averages age-standardized to the 1991 Canadian population

Age-Standardized Incidence Rates (ASIR) by RHA with 95% Confidence Intervals for Invasive Colorectal Cancer, 1998 (average of 1997-1999)*





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COLORECTAL CANCER - MORTALITY

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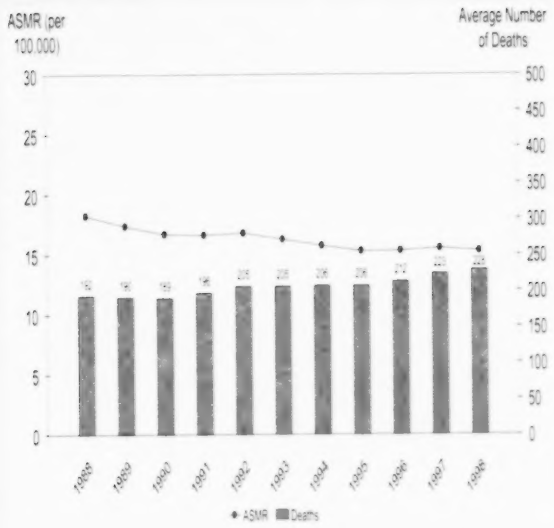
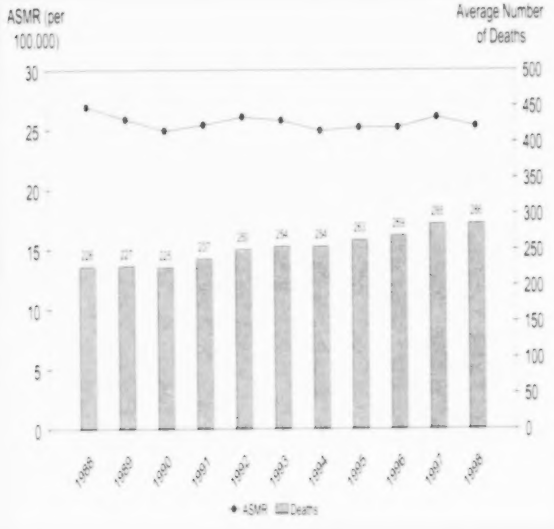


Males



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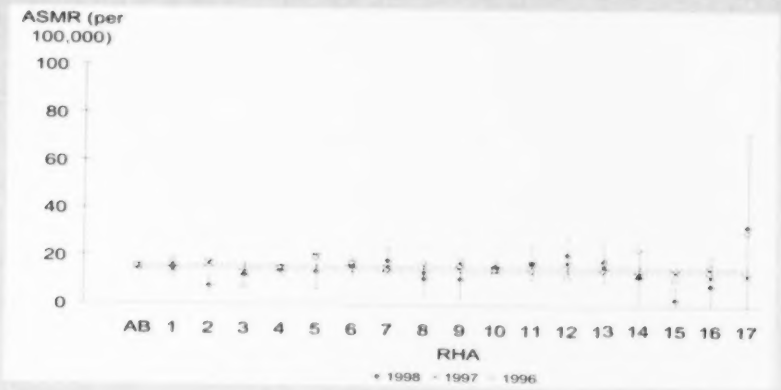
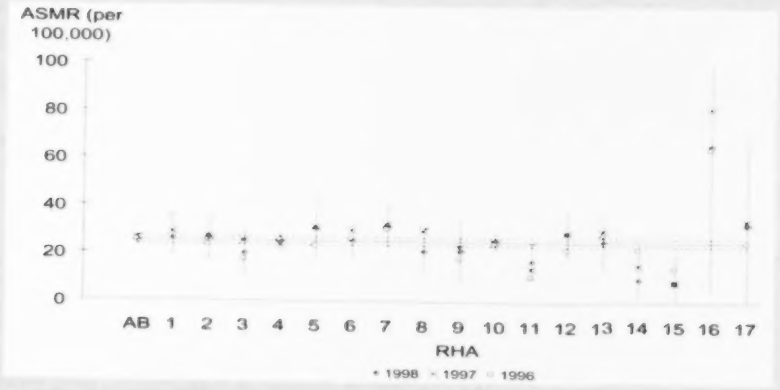


Males



There is little variability across the RHAs or year-over-year in the age-standardized mortality rates among men and women.

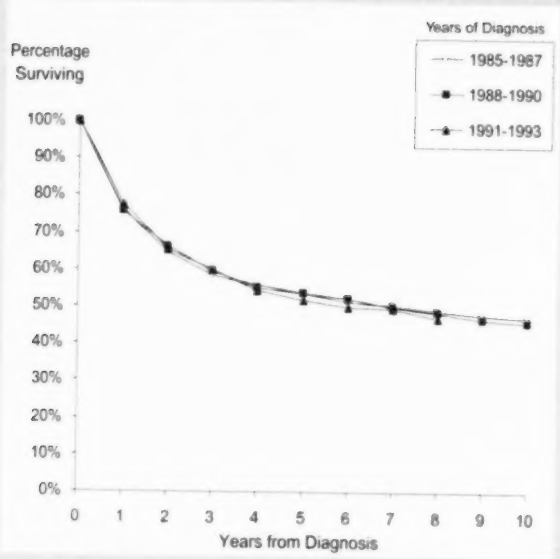
Note that the boundaries for several RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

* Three-year averages age-standardized to the 1991 Canadian population

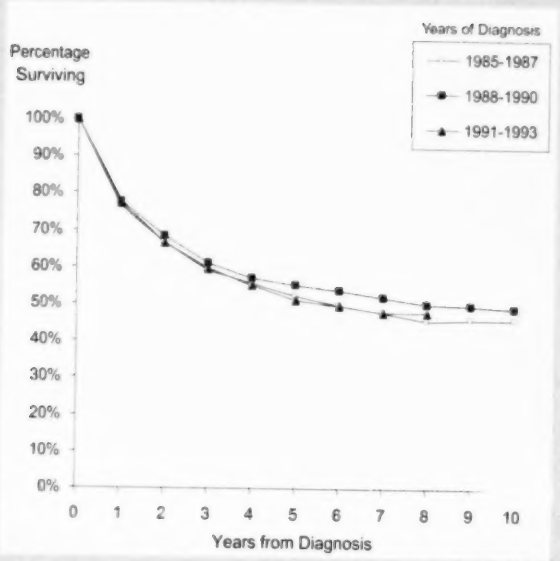
COLORECTAL CANCER - SURVIVAL CURVES

Relative Survival Curves for Invasive Colorectal Cancer, Alberta (cases diagnosed 1985-1993)

Females



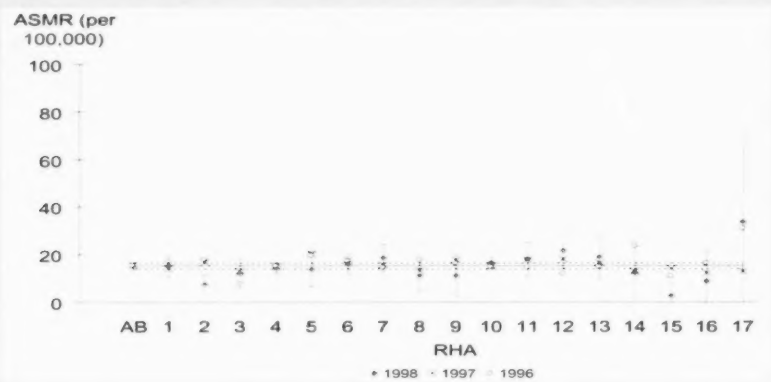
Males



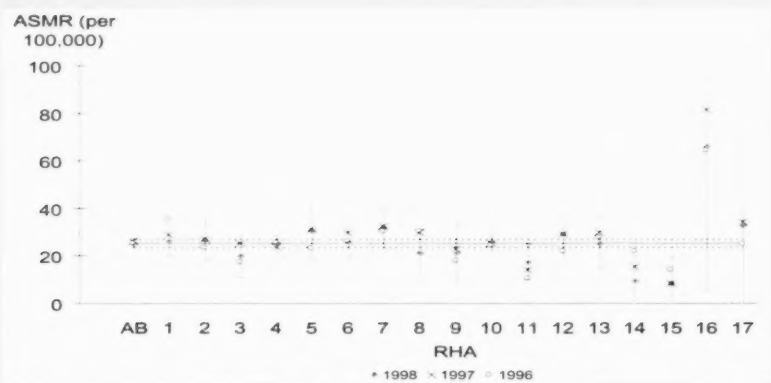
Approximately 50% of patients diagnosed with colorectal cancer survive five years. In contrast to lung cancer, females diagnosed with colorectal cancer do not have a better survival rate than males. There has not been significant change in survival after diagnosis of colorectal cancer over the nine years of data shown.

Age-Standardized Mortality Rates (ASMR) by RHA with 95% Confidence Intervals for Invasive Colorectal Cancer, 1998 (average of 1997-1999)*

Females



Males



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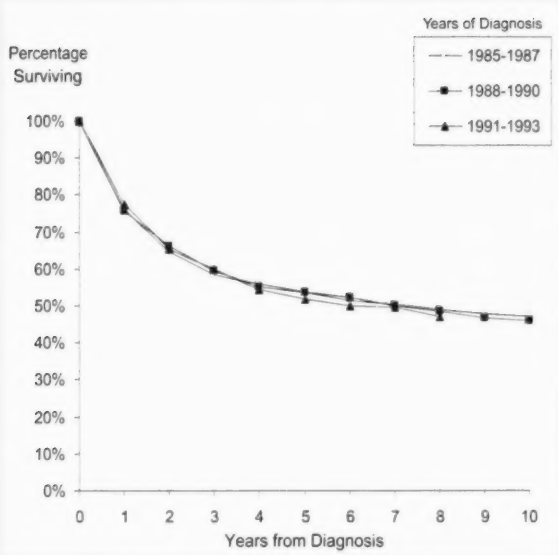
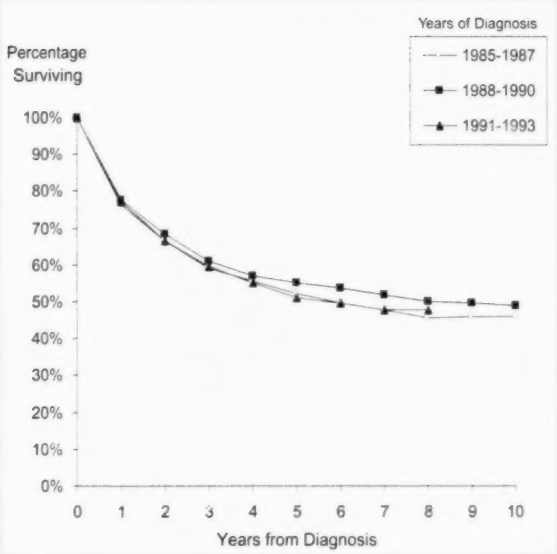


Males



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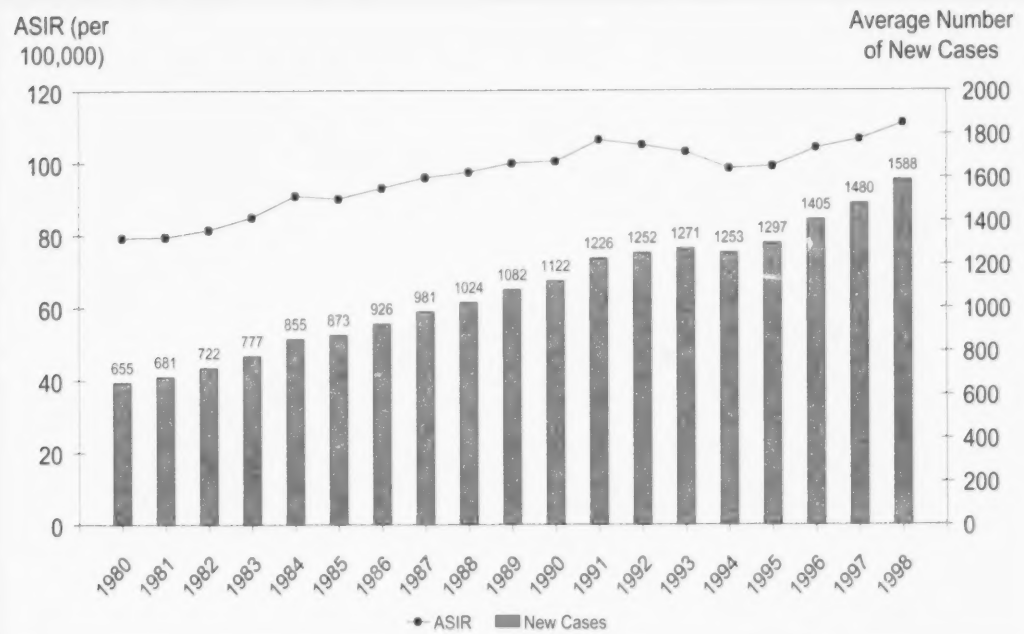
BREAST CANCER - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for Invasive Breast Cancer, Females, Alberta (1980-1998)

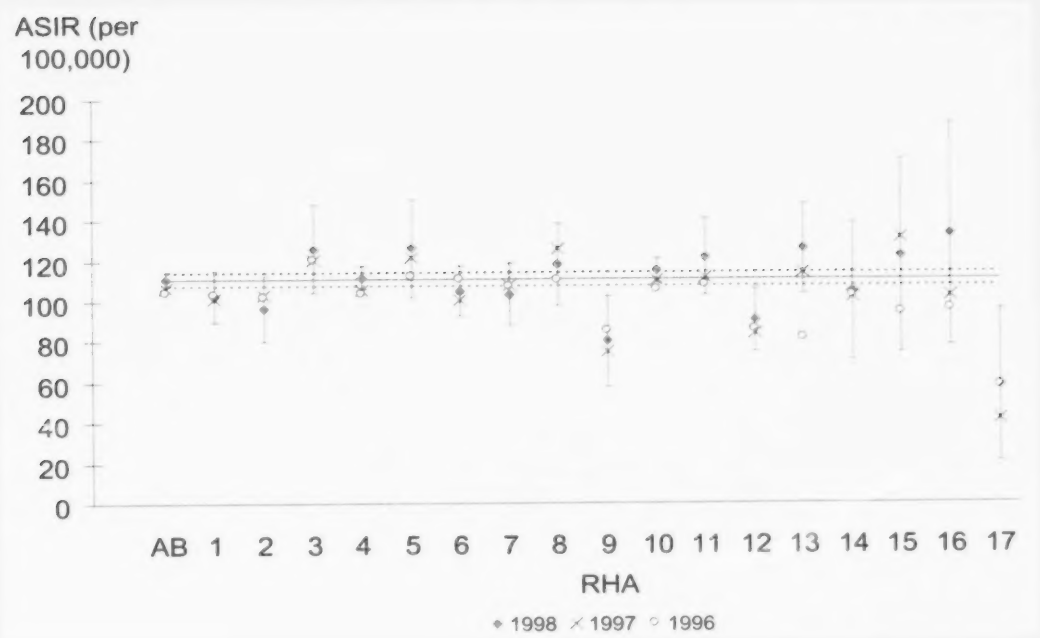


Incidence rates for breast cancer steadily increased until the mid 1990s when the rates began to stabilize. However, since 1994 there is an indication that the rates may be increasing again. These trends may reflect an increase in screening mammography that occurred in the late 1980s and early 1990s.

More cancers are found earlier through screening mammography than would have been previously detected. However, even without the effect of screening mammography, there has been an underlying gradual increase in breast cancer incidence rates that goes back many years. The reason for this is not well understood.

* Three-year averages age-standardized to the 1991 Canadian population

Age-Standardized Incidence Rates (ASIR) by RHA with 95% Confidence Intervals for Invasive Breast Cancer, Females, 1998 (average of 1997-1999)*



There is some variability in breast cancer incidence among the RHAs with smaller populations, but note the large confidence intervals.

Note that the boundaries for several RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

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BREAST CANCER - INCIDENCE

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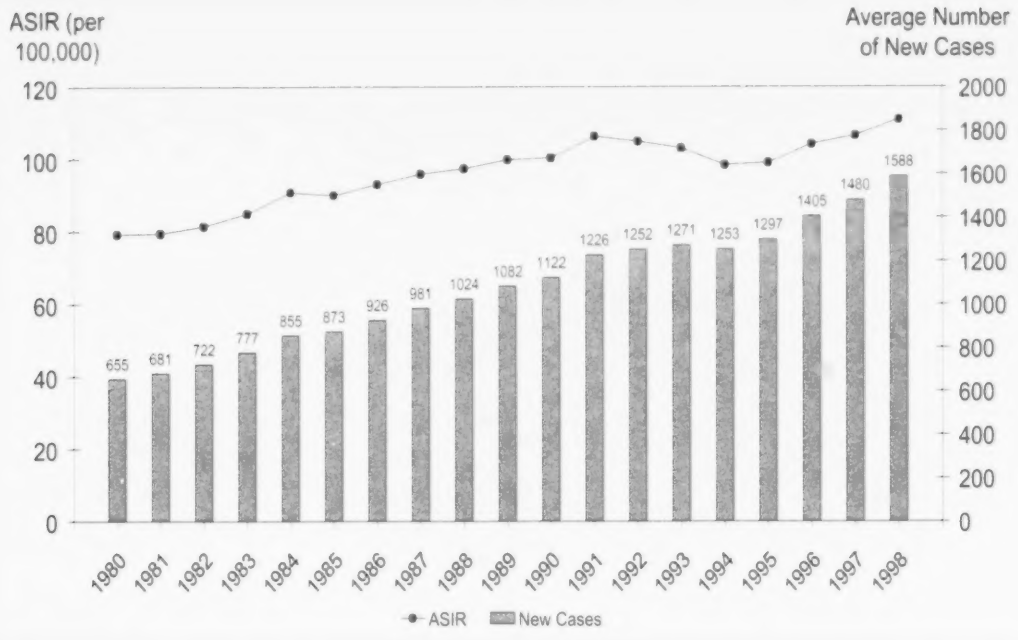

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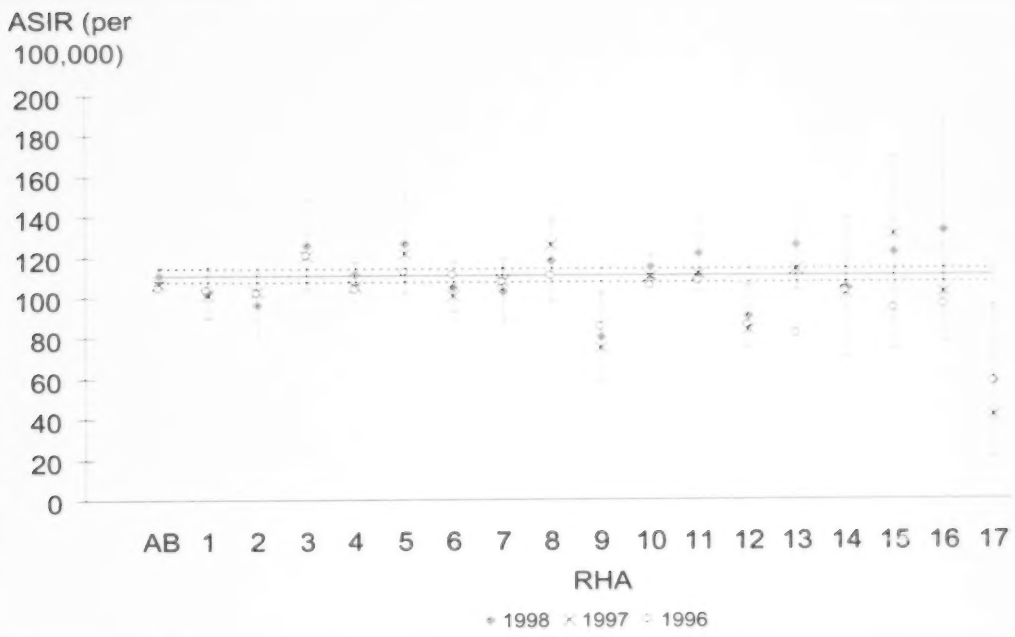

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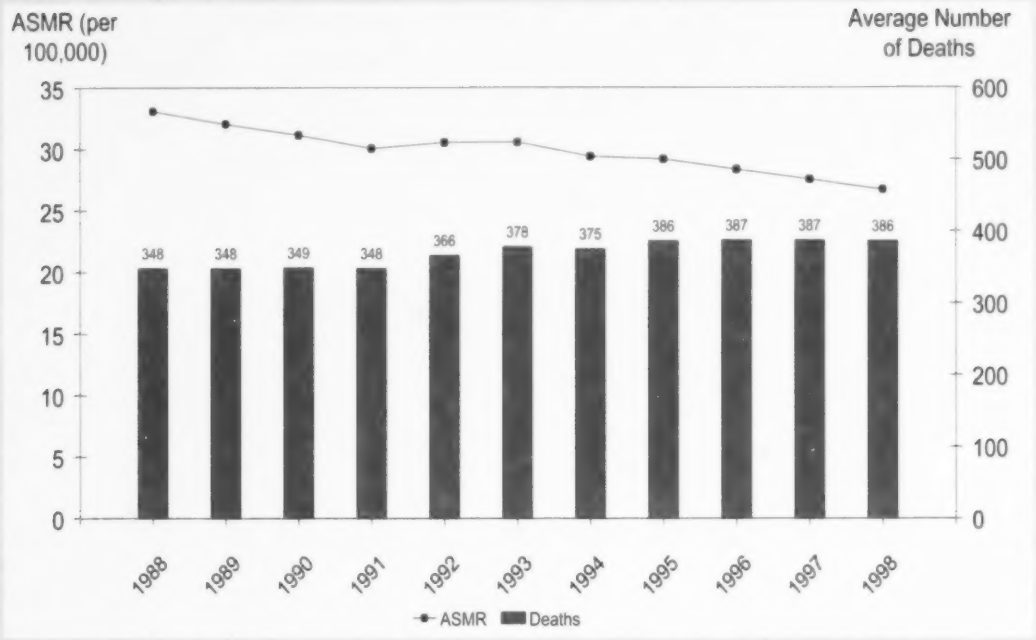
* Three-year averages age-standardized to the 1991 Canadian population

BREAST CANCER - MORTALITY

Age-Standardized Mortality Rates (ASMR)* and the Number of Deaths for Invasive Breast Cancer, Females, Alberta (1988-1998)



Breast cancer mortality rates are gradually decreasing. This may reflect the impact of mammography screening, improvements in treatment, or both of these factors.

The fact that incidence rates increased while mortality rates decreased reflects better survival for diagnosed cases as shown on page 30. Survival rates are much higher for cancers found at an earlier stage.

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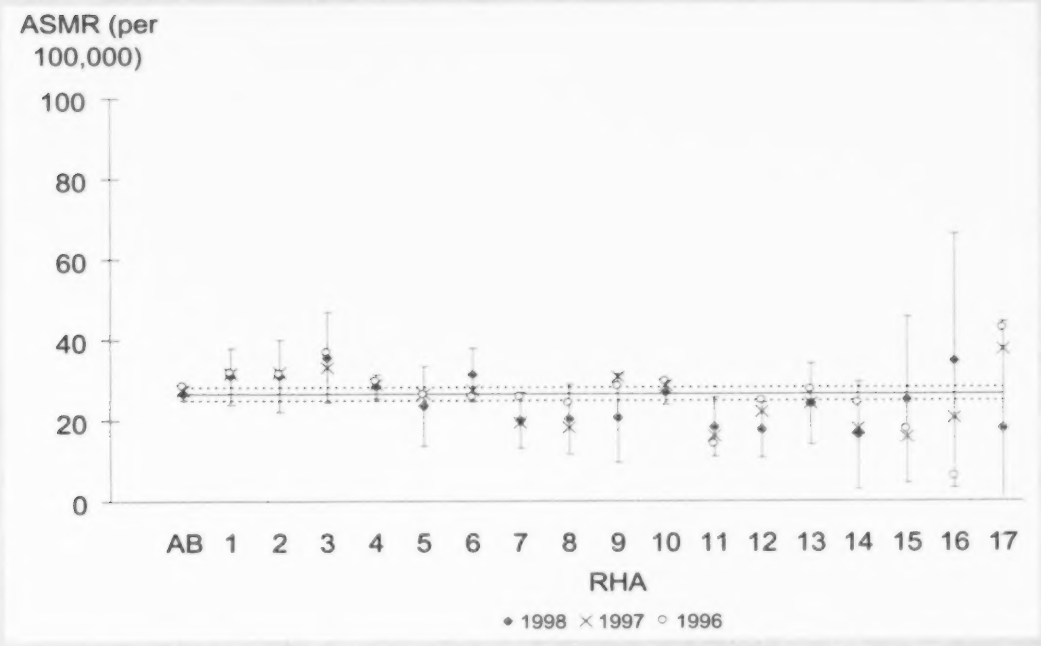
Age-Standardized Mortality Rates (ASMR) by RHA with 95% Confidence Intervals for Invasive Breast Cancer, Females, 1998 (average of 1997-1999)*



For 1998 there continues to be little variation of breast cancer mortality rates across the RHAs except for those RHAs with very small populations.

Note that the boundaries for several RHAs changed in April 2001. The statistics plotted above have all been calculated using the new RHA boundaries.

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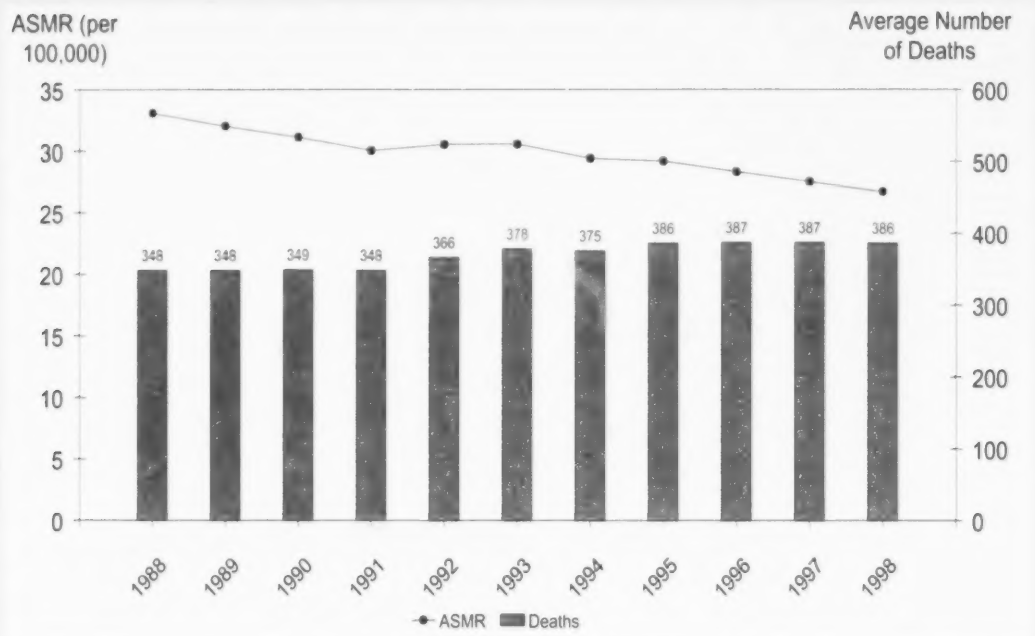

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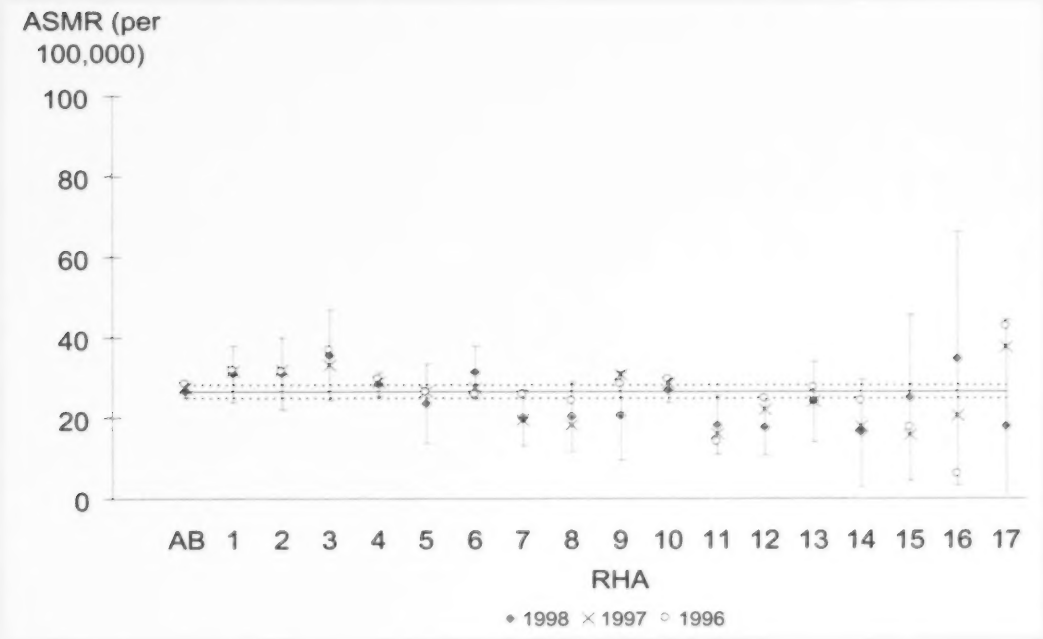

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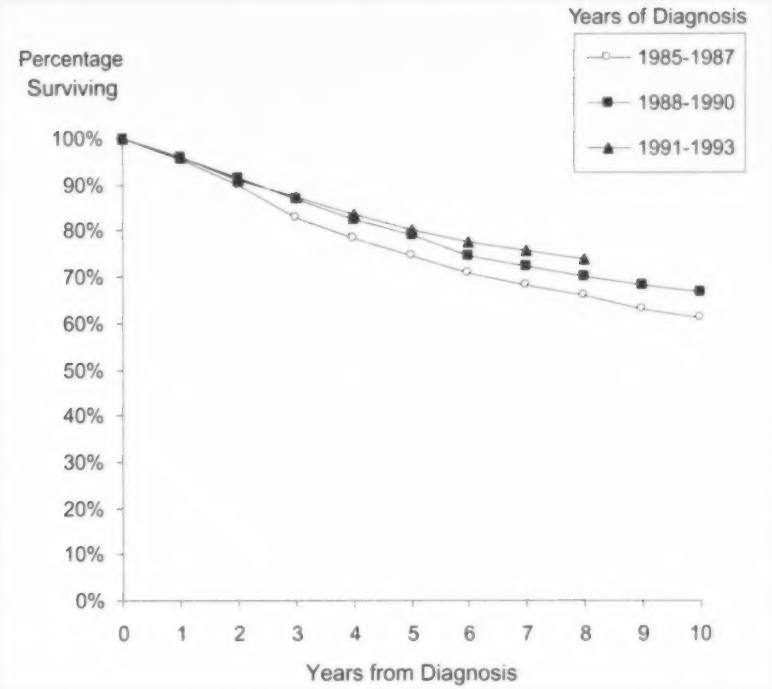
BREAST CANCER - SURVIVAL CURVES

Relative Survival Curves for Invasive Breast Cancer, Females, Alberta (cases diagnosed 1985-1993)



Breast cancer survival has improved over time. The five year survival rates were 75% for those diagnosed between 1985 and 1987 and 80% for those diagnosed between 1991 and 1993. This is cause for considerable hope in the continued battle against breast cancer.

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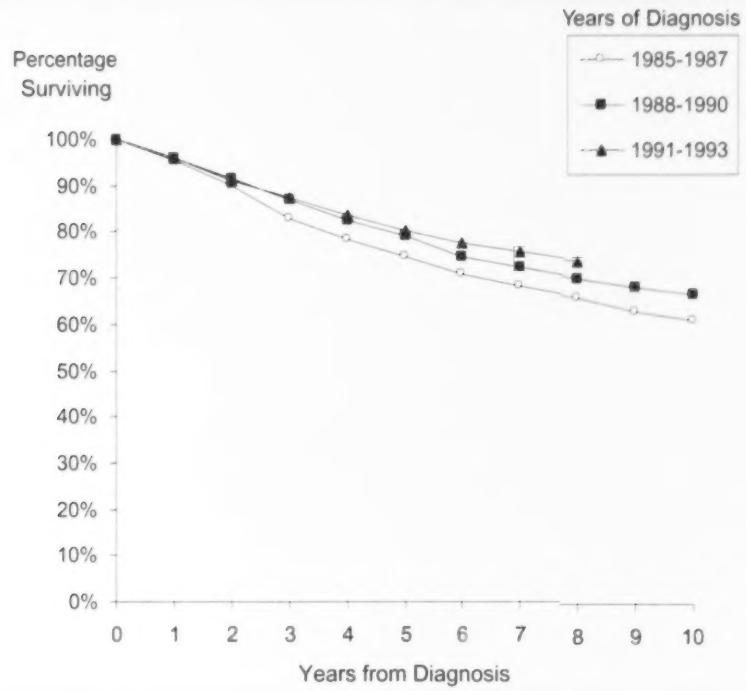

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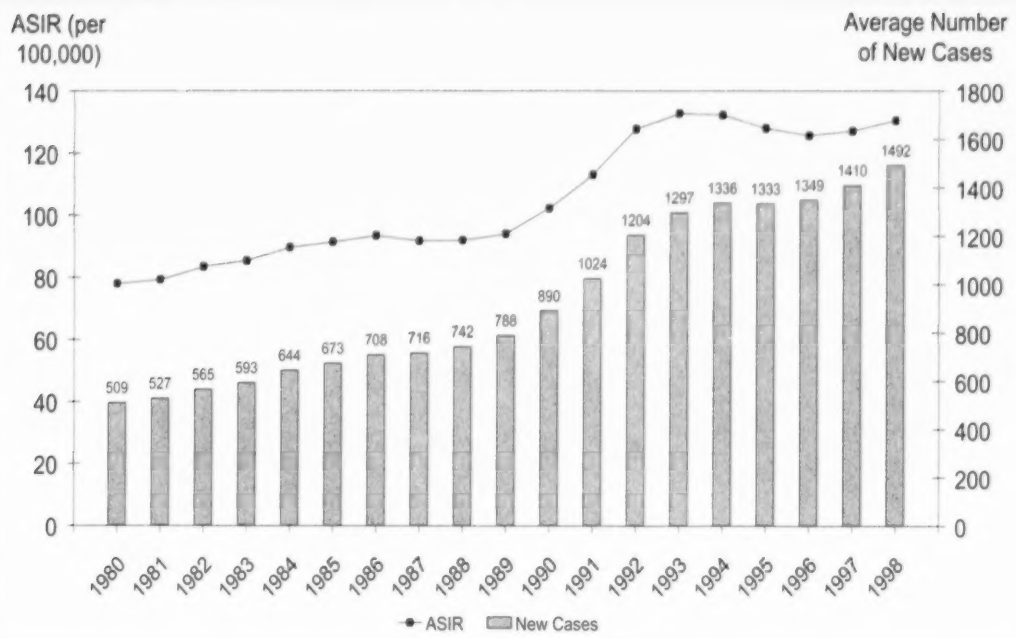
PROSTATE CANCER - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for Invasive Prostate Cancer, Males, Alberta (1980-1998)



Increased incidence of prostate cancer prior to 1990 is partly due to increased detection of cancers following trans-urethral resection of the prostate (TURP) for suspected benign prostatic hypertrophy.

The sharp increase since 1990 is predominantly the result of increased early detection using PSA (prostate specific antigen) testing, which became available in Alberta in 1989. The testing resulted in early detection of clinically unsuspected cancers, advancing the time of diagnosis. This pattern is seen throughout Canada. Since 1996 the increasing trend appears to be similar to that seen before 1986.

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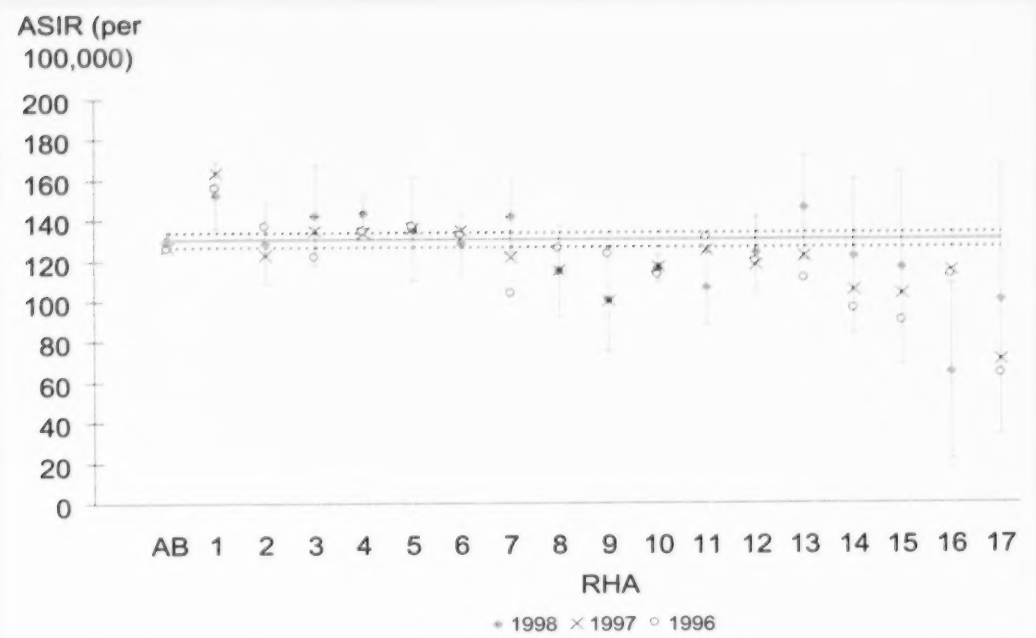

As indicated in previous publications, the 1998 incidence rates are generally higher in the southern RHAs and lower in the northern RHAs. This may reflect different patterns of PSA testing in the province, but other explanations are also possible.

Prostate cancer incidence has changed dramatically since 1990 and this is believed to be because of the influence of PSA testing as discussed on page 32. Trends will continue to be monitored by the Alberta Cancer Registry.

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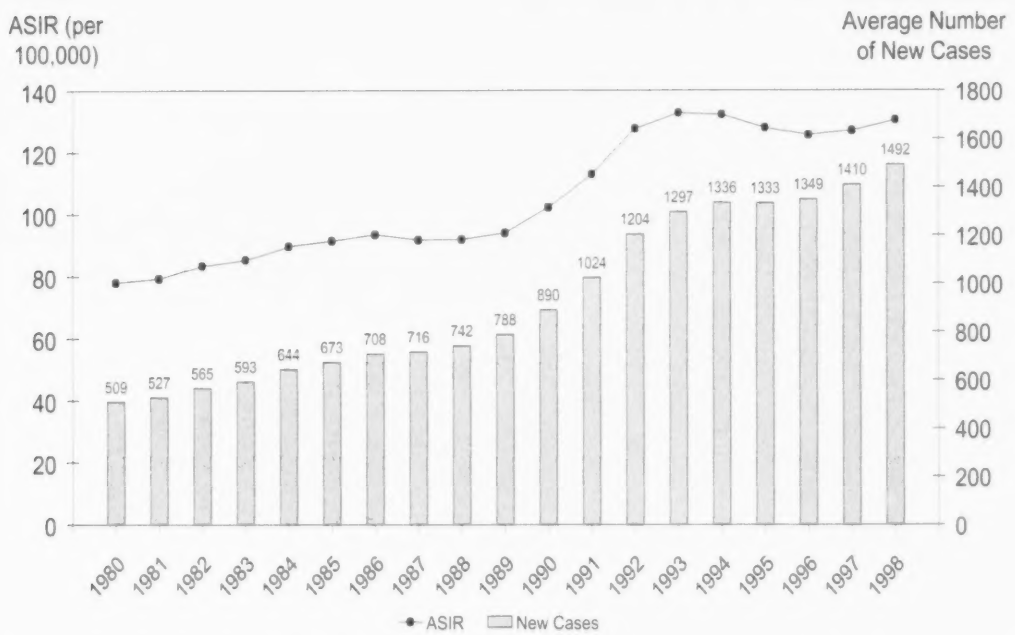

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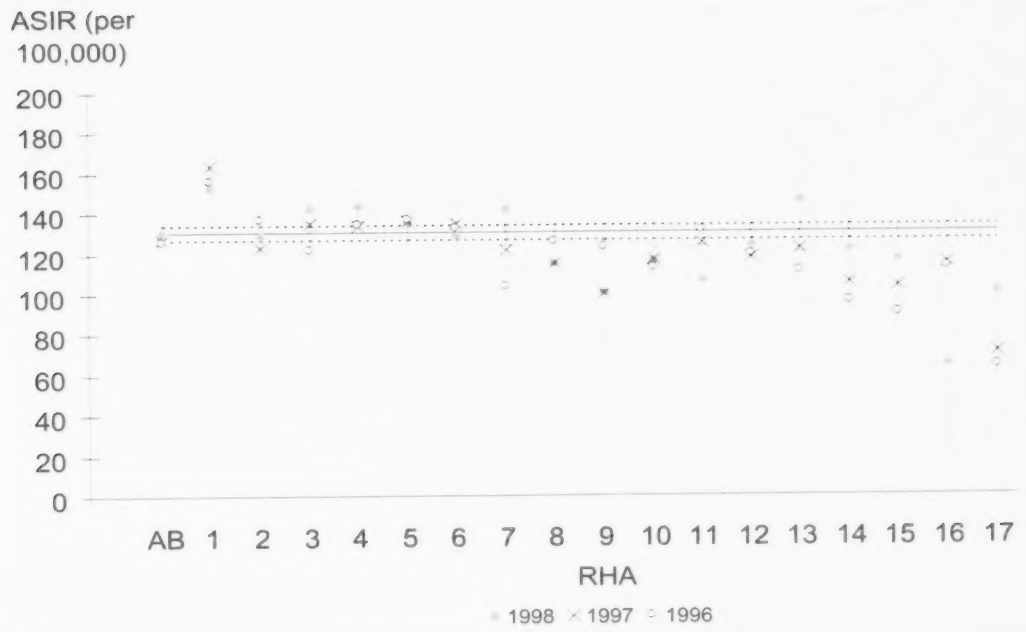

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PROSTATE CANCER - MORTALITY

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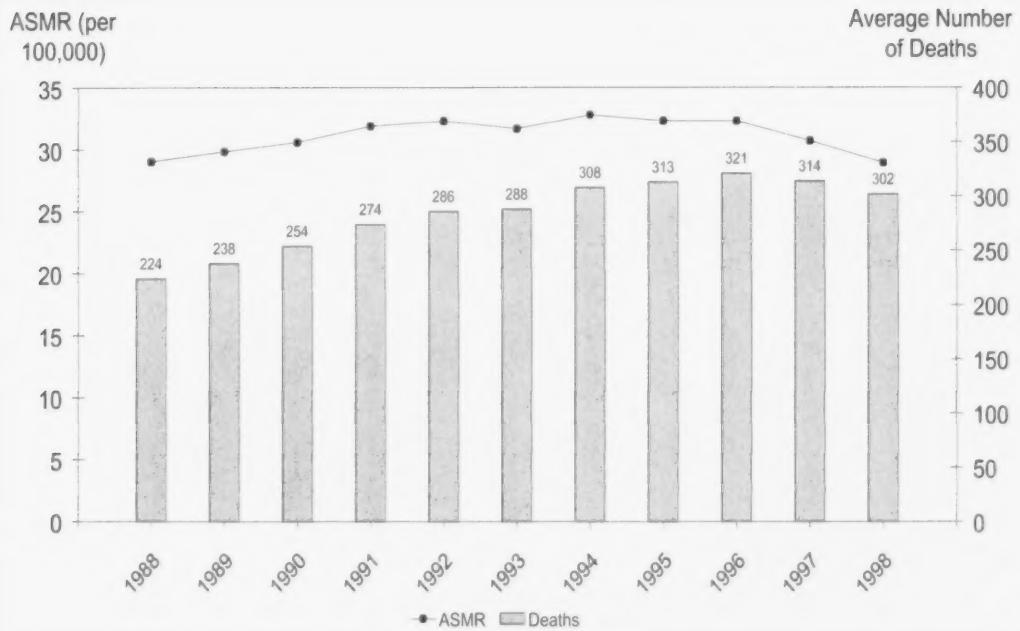

Despite the sharp increase in prostate cancer incidence from 1990-1993, there has not been an associated increase in mortality rates. Age-standardized mortality rates have been relatively stable since 1990 although there is indication of a decrease in more recent years. However, the average number of deaths have gradually increased since that time. This increase will be monitored to see if it continues over a number of years or begins to stabilize.

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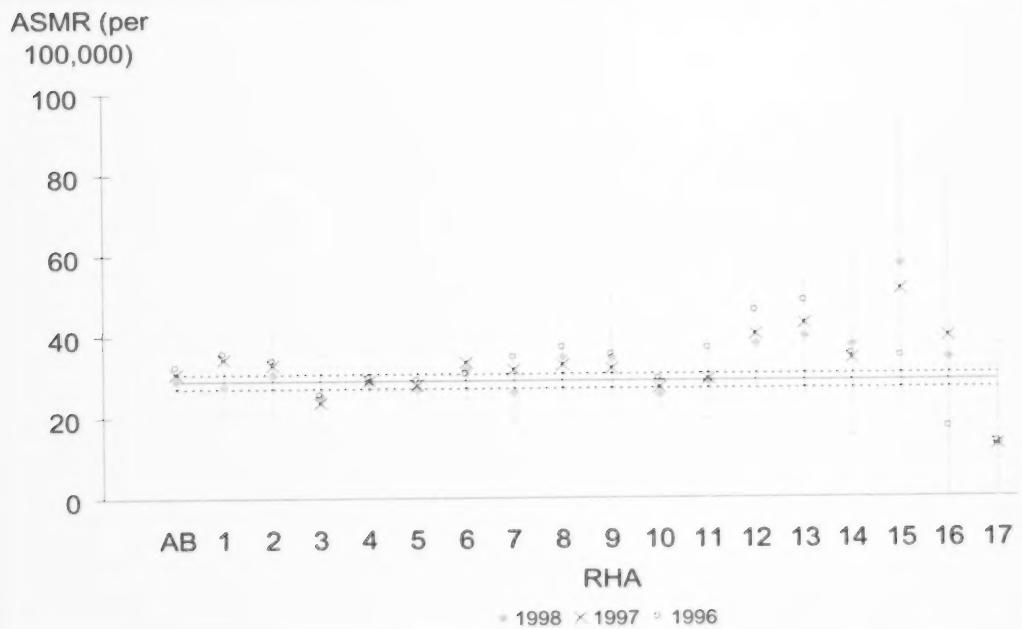

There is less variation across RHAs and year-over-year in mortality rates, compared to the variability in incidence rates. This adds strength to the suggestion that the higher incidence in some areas may be due to differences in detection patterns.

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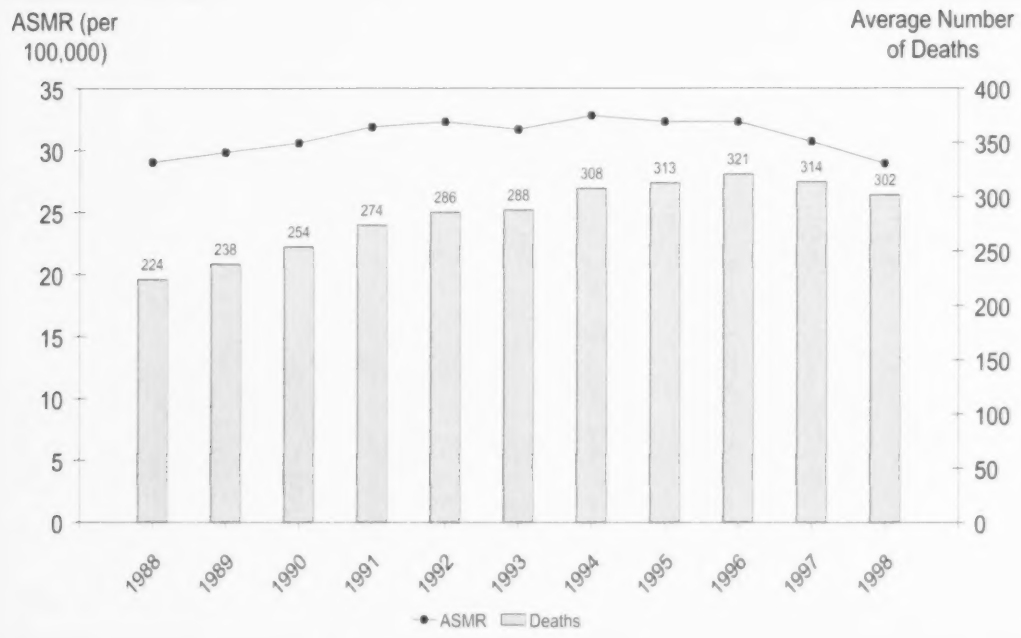

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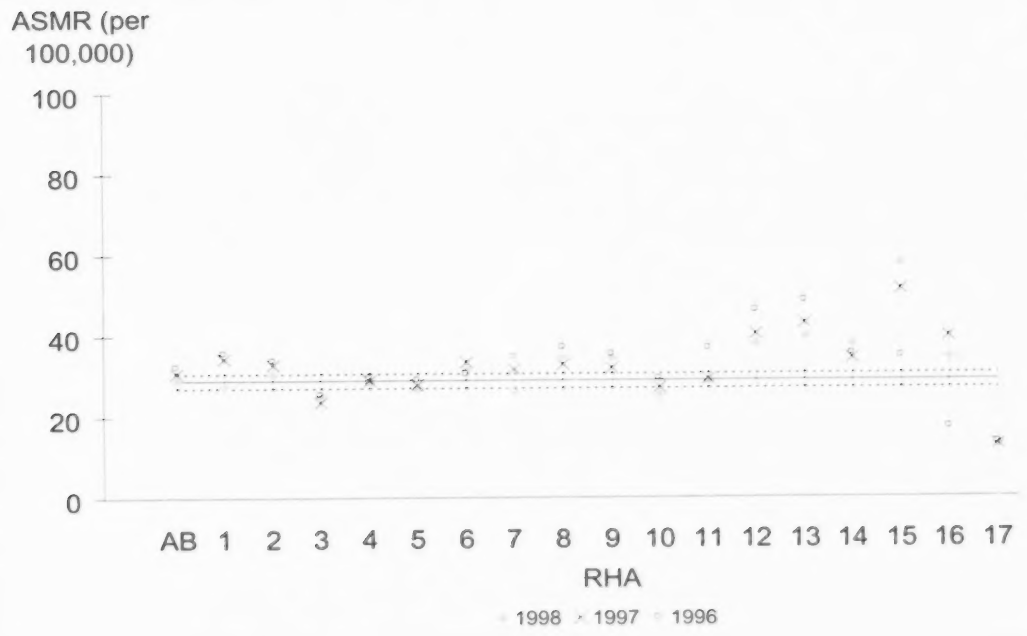

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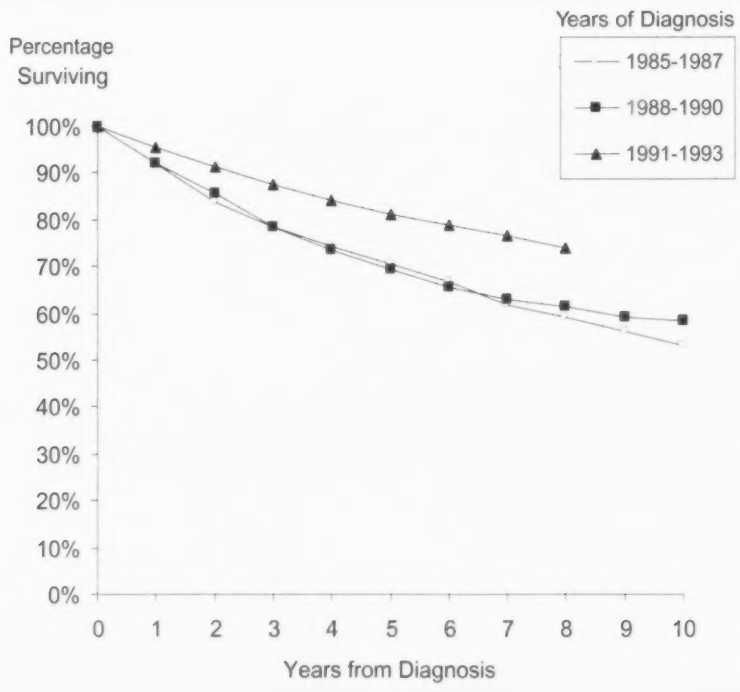

Survival after prostate cancer is good, with at least 70% of cases surviving five years. There is a marked improvement in the survival after diagnosis of prostate cancer for those cases diagnosed between 1991 and 1993. This is probably due to the increase in PSA testing which resulted in early detection of cancers that may not have been otherwise diagnosed. These cancers, which previously would not have been reported, have little or no effect on mortality rates and thus skew the survival curves upwards.

Although trials are underway, results will not be available for several years and there is not currently enough evidence to suggest that population-based screening can reduce deaths from prostate cancer.

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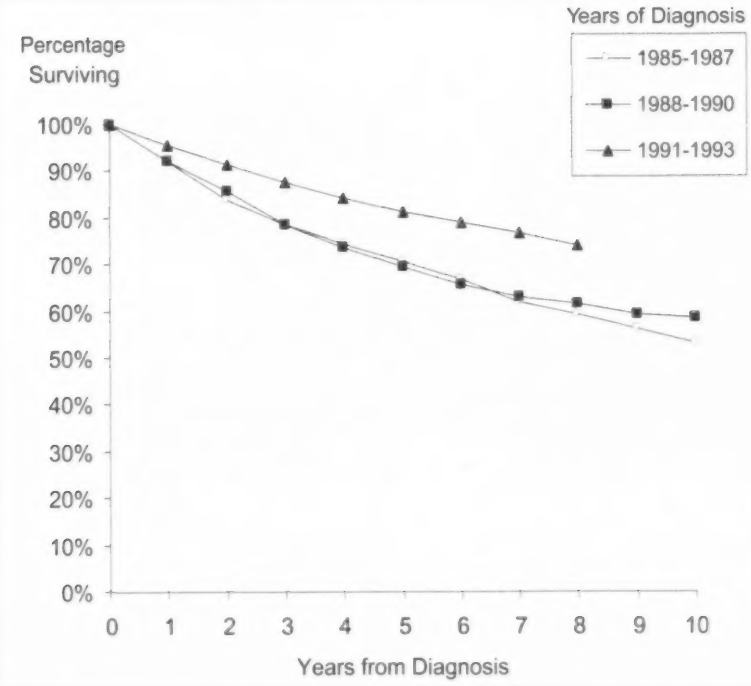

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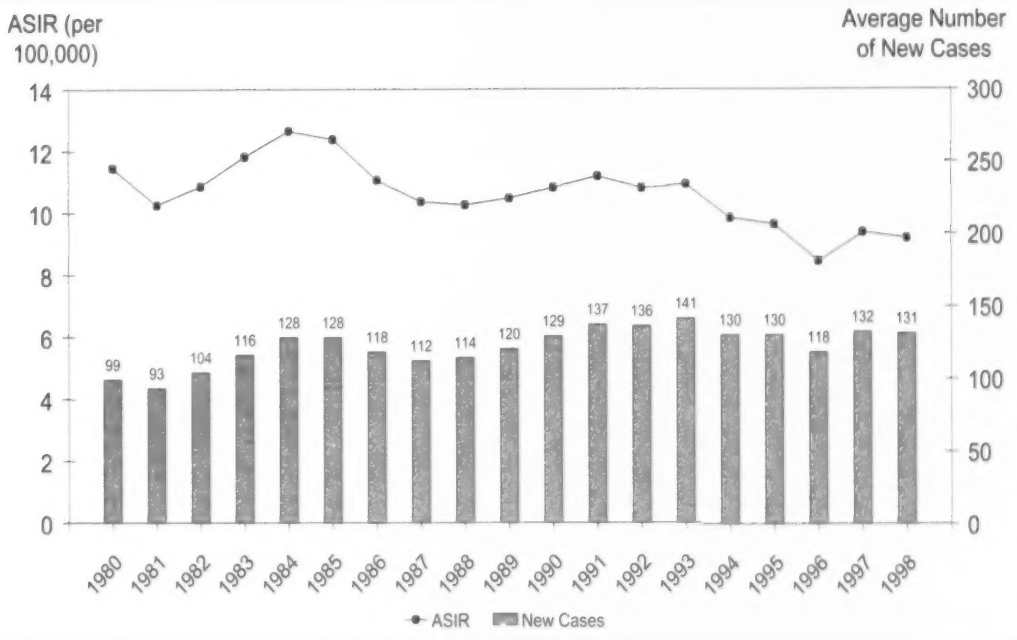
CERVICAL CANCER - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for Invasive Cervical Cancer, Females, Alberta (1980-1998)



Age-standardized incidence rates for cervical cancer have decreased since the mid 1980s. Pap smear screening can actually prevent the incidence of invasive cervical cancer by detecting and effectively treating pre-cancers, and is likely responsible for most of the decrease. In 1998, over 130 cases of invasive cervical cancer were recorded. In addition, approximately 1,500 cases of cervical carcinoma in-situ (lesions that have not spread beyond the surface of the cervix) were recorded.

An organized cervical cancer screening program could further reduce incidence rates by targeting women with lower screening rates. Planning for an organized cervical cancer screening program for Alberta began in 2000, with full implementation to occur over several years.

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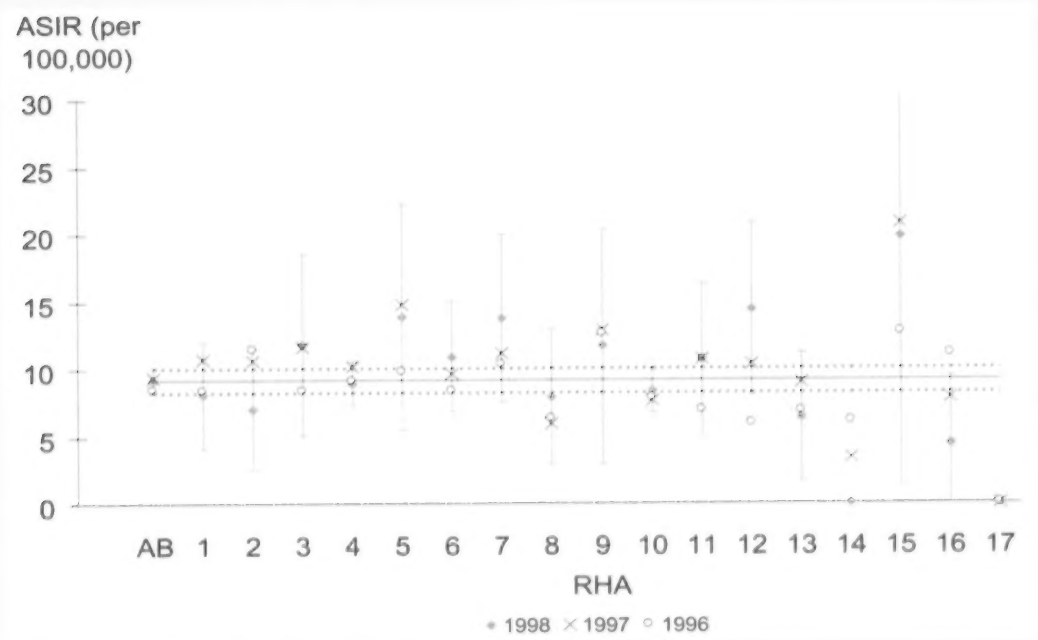
Age-Standardized Incidence Rates (ASIR) by RHA with 95% Confidence Intervals for Invasive Cervical Cancer, Females, 1998 (average of 1997-1999)*



There continues to be little variation in cervical cancer incidence rates across the RHAs for 1998. Note that the RHAs that display slightly varied rates and large confidence intervals are those with a relatively small population.

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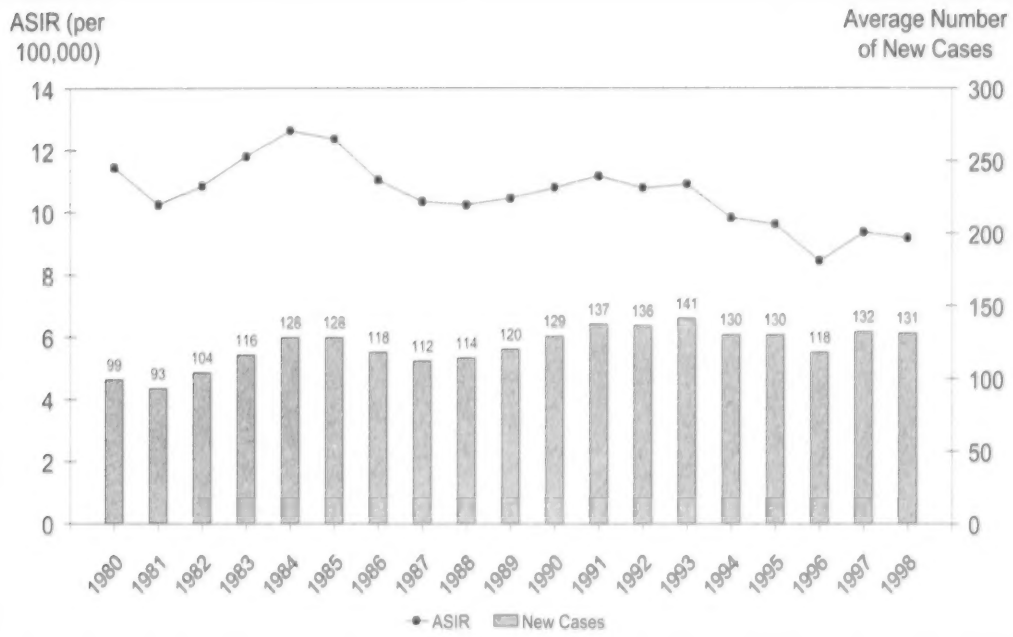

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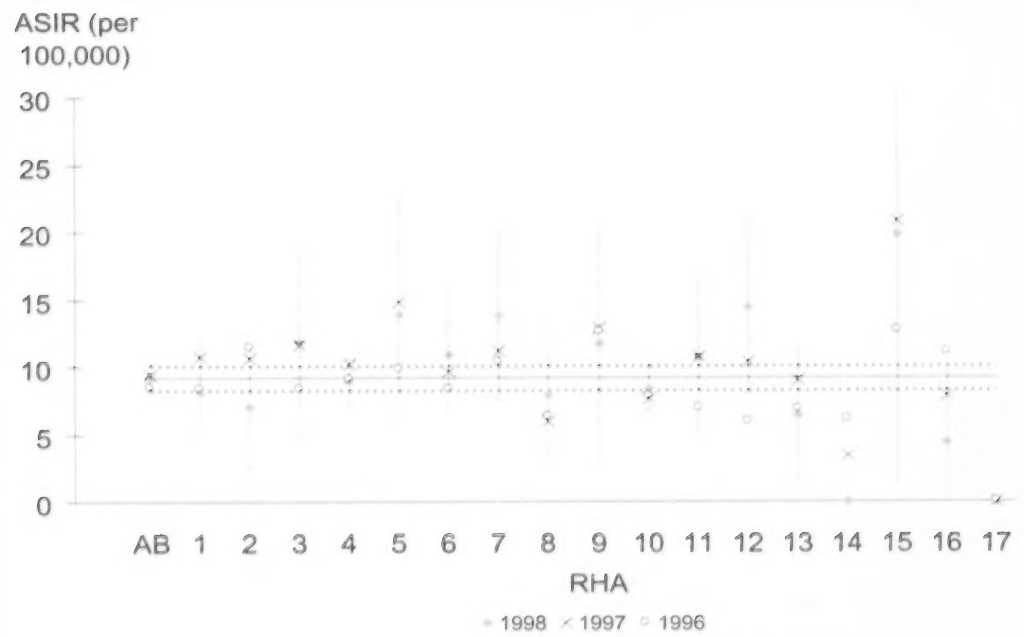

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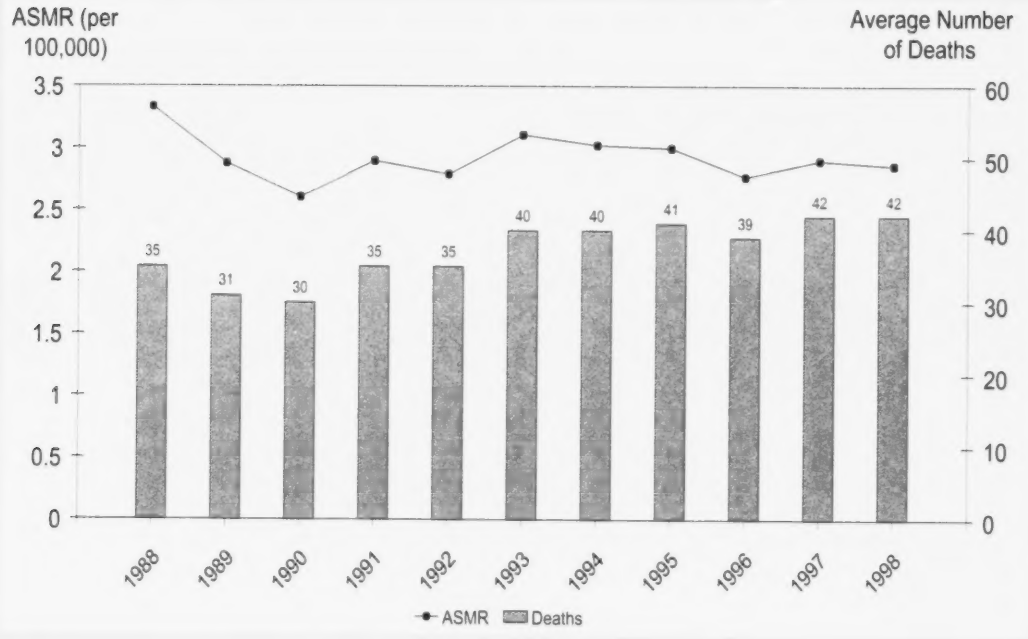

Cervical cancer has a very good prognosis when detected and treated early; therefore the mortality rates are considerably lower than the incidence rates. Nonetheless, over 40 Alberta women died in 1998 from cervical cancer and many of those deaths could have been prevented.

Note that regional mortality rates are not presented for cervical cancer because of the small number of deaths.

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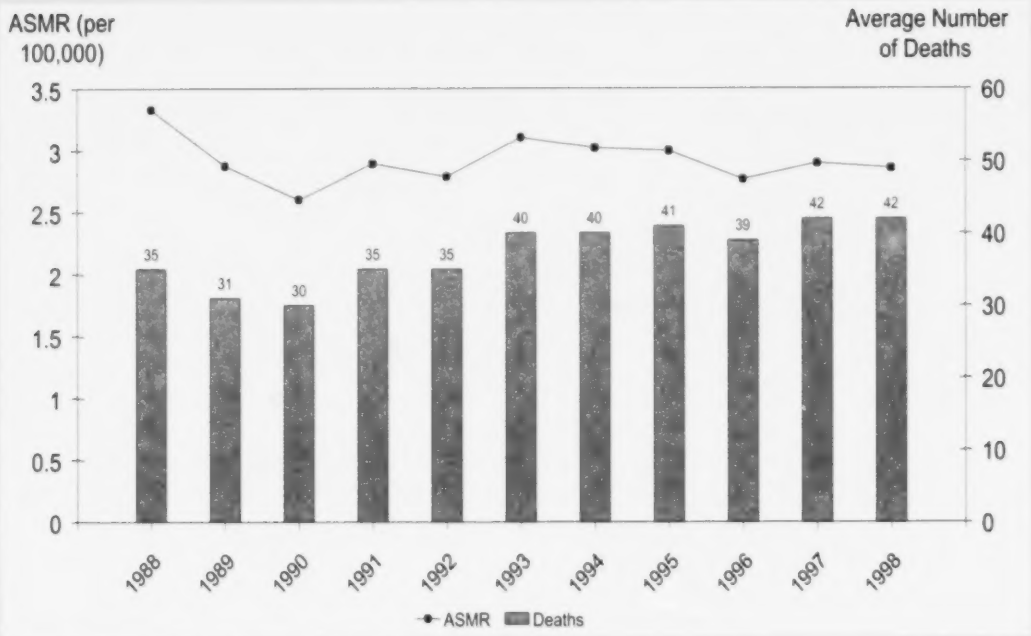

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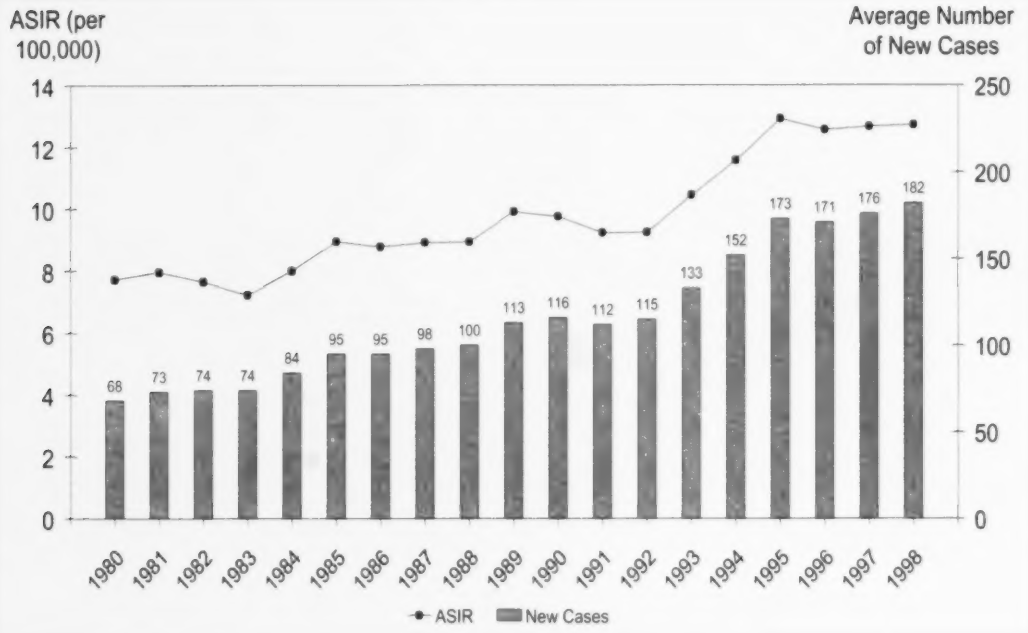
MELANOMA - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for Invasive Melanoma, Females, Alberta (1980-1998)



Melanoma skin cancer showed a sharp increase from 1992 to 1995 but rates have since leveled off. The increase in incidence of this cancer could be largely due to a change in cancer registration coding procedures. In 1993 the Alberta Cancer Registry adopted the NAACCR** coding rules as developed by the SEER*** program – this method of coding captured more cancers. The cancer rates stabilized after 1995 as the effect of the 1993 coding changes leveled off.

Note that mortality data are not included for melanoma skin cancer. Even though it is by far the most serious form of skin cancer, the survival rate is very high when detected and treated early.

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** NAACCR - North American Association of Central Cancer Registries
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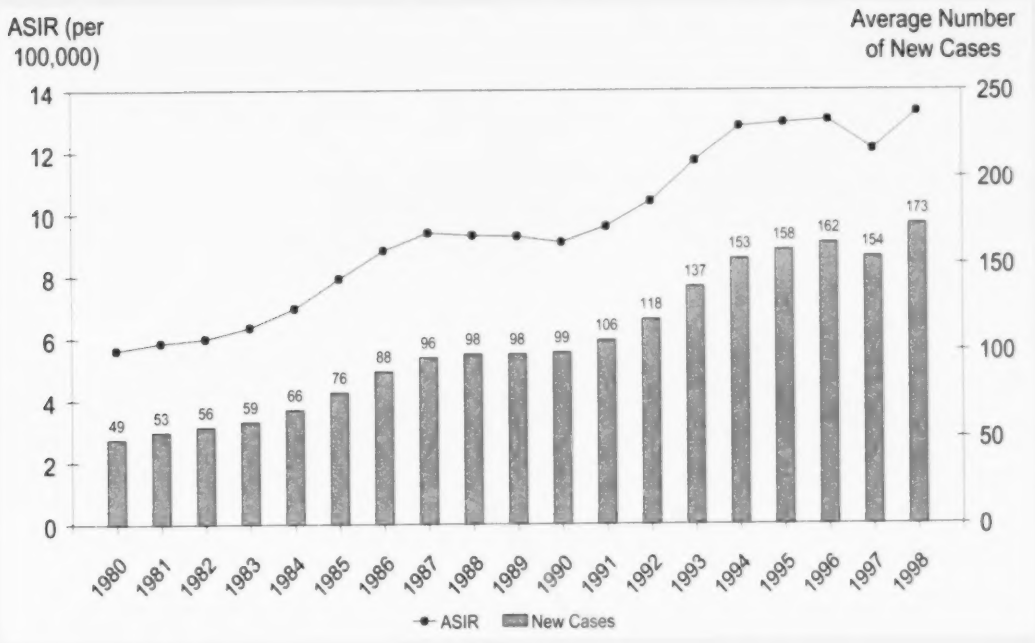

Melanoma shows a similar increase in incidence for males and females in the early 1990s. However since then the rates have leveled off.

An explanation for the trends in melanoma skin cancer can be found on the previous page.

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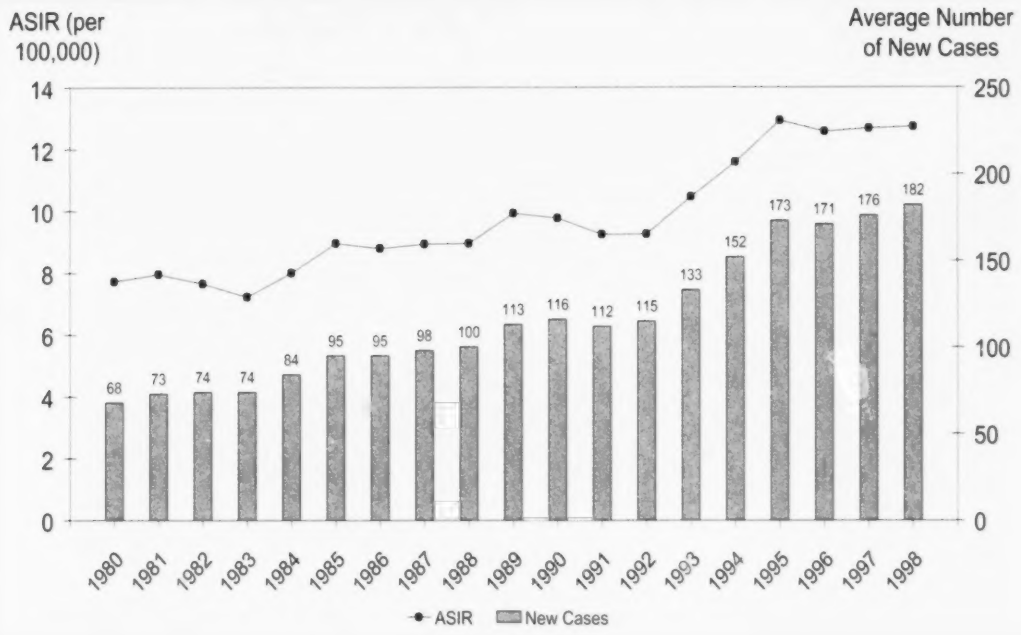

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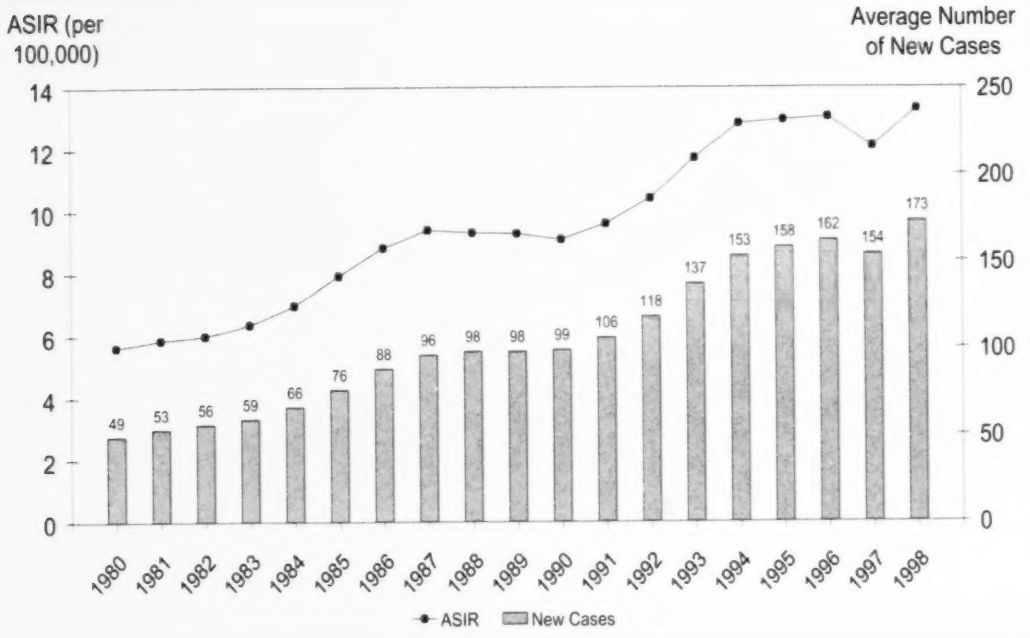

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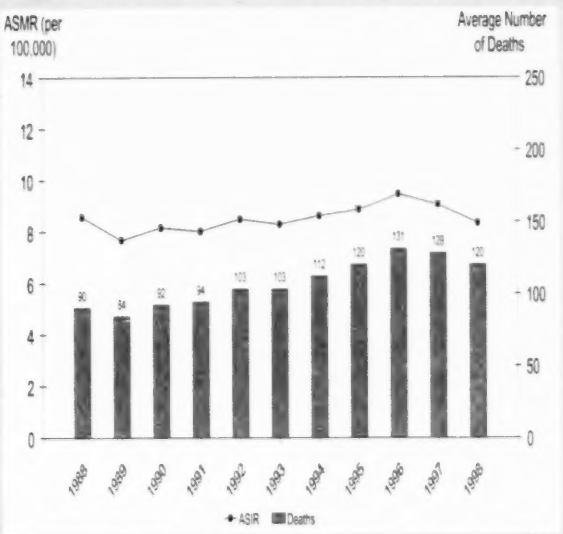
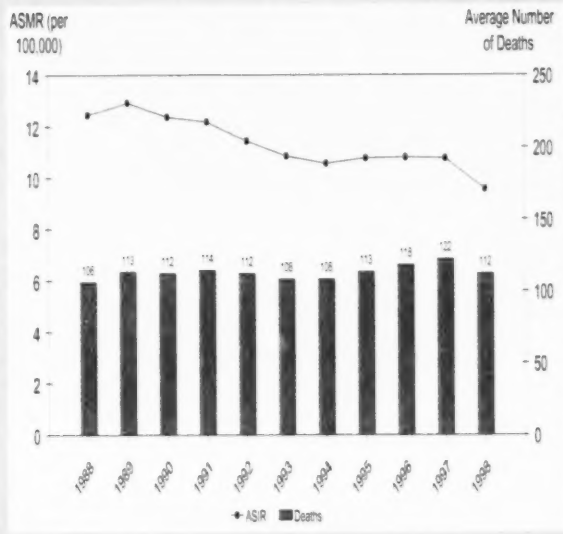
PANCREAS CANCER - MORTALITY

Age-Standardized Mortality Rates (ASMR)* and the Number of Deaths for Invasive Pancreas Cancer, Alberta (1988-1998)

Females



Males



Incidence data are not included for cancer of the pancreas because mortality rates are so similar to incidence. Mortality for cancer of the pancreas gradually increased in females up to 1996 and subsequently appears to be decreasing. In males it has decreased over the whole period. Although this cancer accounts for only two percent of incident cancers, in 1998 it was the sixth leading cause of cancer deaths in Alberta due to its low survival rate. There is little variation in mortality rates for pancreatic cancer among the RHAs.

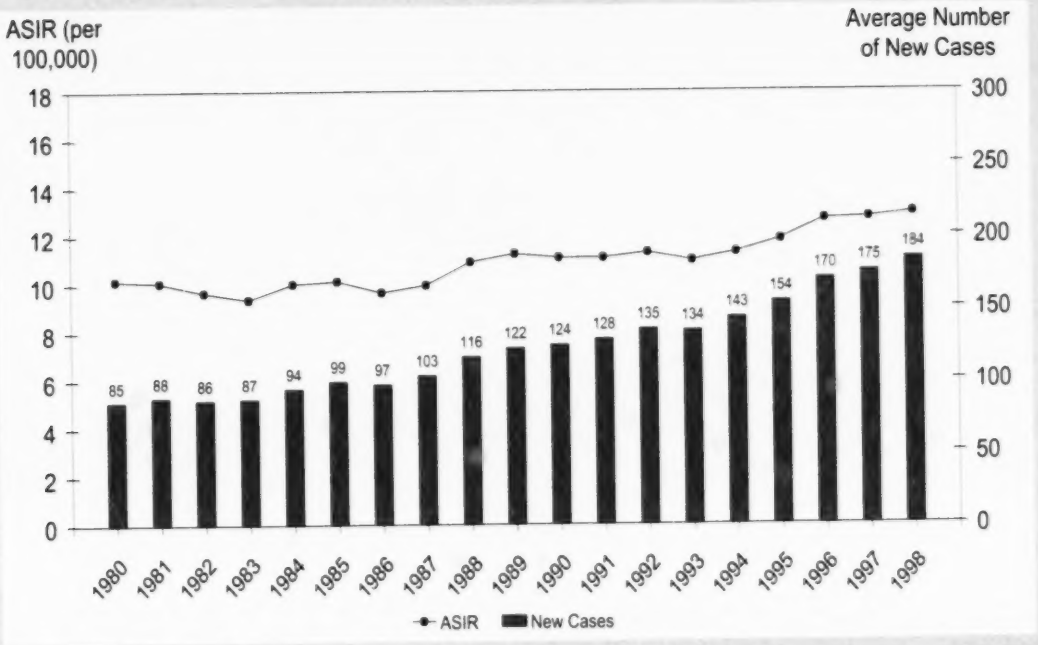
The only well-established risk factor of significance is smoking.** The cause for most cases of pancreatic cancer, however, is not known.

* Three-year averages age-standardized to the 1991 Canadian population

** Stephens, F. O., *The Increased Incidence of Cancer of the Pancreas*, Australian New Zealand Journal of Surgery. May 1999; 69(5) 331.

NON-HODGKIN LYMPHOMA - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for Non-Hodgkin Lymphoma, Females, Alberta (1980-1998)



Non-Hodgkin lymphoma age-standardized incidence rates have been increasing in females. This is similar to the pattern seen in Canada as a whole. Little of the increase in Non-Hodgkin lymphoma can be explained by known viral or environmental risk factors.**

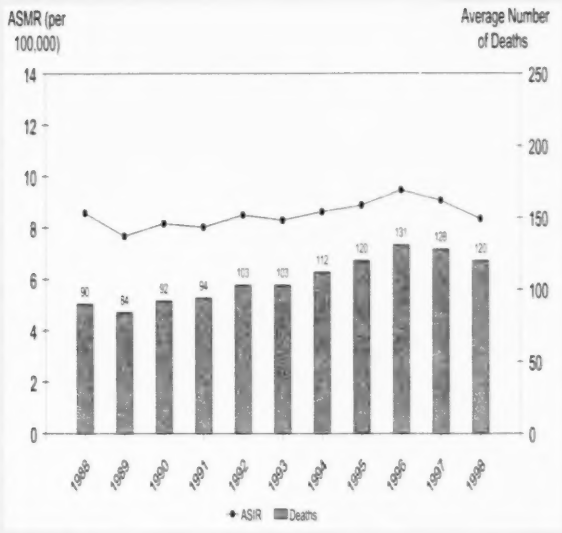
* Three-year averages age-standardized to the 1991 Canadian population

** Camelos, George P., Andrew Lister and Jeffrey Sklar. *The Lymphomas* (Philadelphia: W.B.. Saunders Company, 1998) 58.

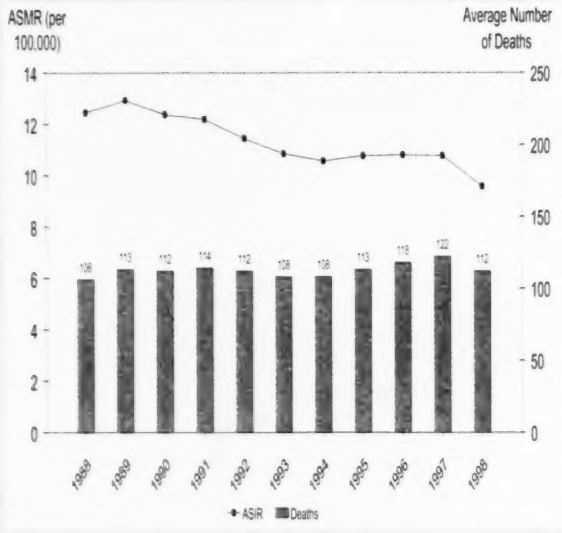
PANCREAS CANCER - MORTALITY

Age-Standardized Mortality Rates (ASMR)* and the Number of Deaths for Invasive Pancreas Cancer, Alberta (1988-1998)

Females



Males



Incidence data are not included for cancer of the pancreas because mortality rates are so similar to incidence. Mortality for cancer of the pancreas gradually increased in females up to 1996 and subsequently appears to be decreasing. In males it has decreased over the whole period. Although this cancer accounts for only two percent of incident cancers, in 1998 it was the sixth leading cause of cancer deaths in Alberta due to its low survival rate. There is little variation in mortality rates for pancreatic cancer among the RHAs.

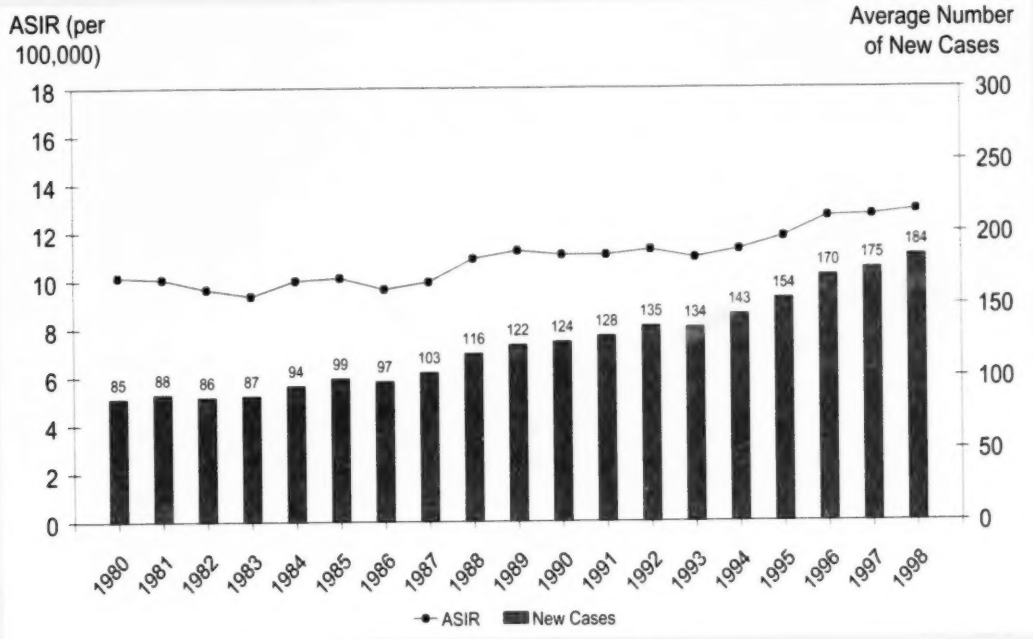
The only well-established risk factor of significance is smoking.** The cause for most cases of pancreatic cancer, however, is not known.

* Three-year averages age-standardized to the 1991 Canadian population

** Stephens, F. O., *The Increased Incidence of Cancer of the Pancreas*, Australian New Zealand Journal of Surgery. May 1999; 69(5) 331.

NON-HODGKIN LYMPHOMA - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for Non-Hodgkin Lymphoma, Females, Alberta (1980-1998)



Non-Hodgkin lymphoma age-standardized incidence rates have been increasing in females. This is similar to the pattern seen in Canada as a whole. Little of the increase in Non-Hodgkin lymphoma can be explained by known viral or environmental risk factors.**

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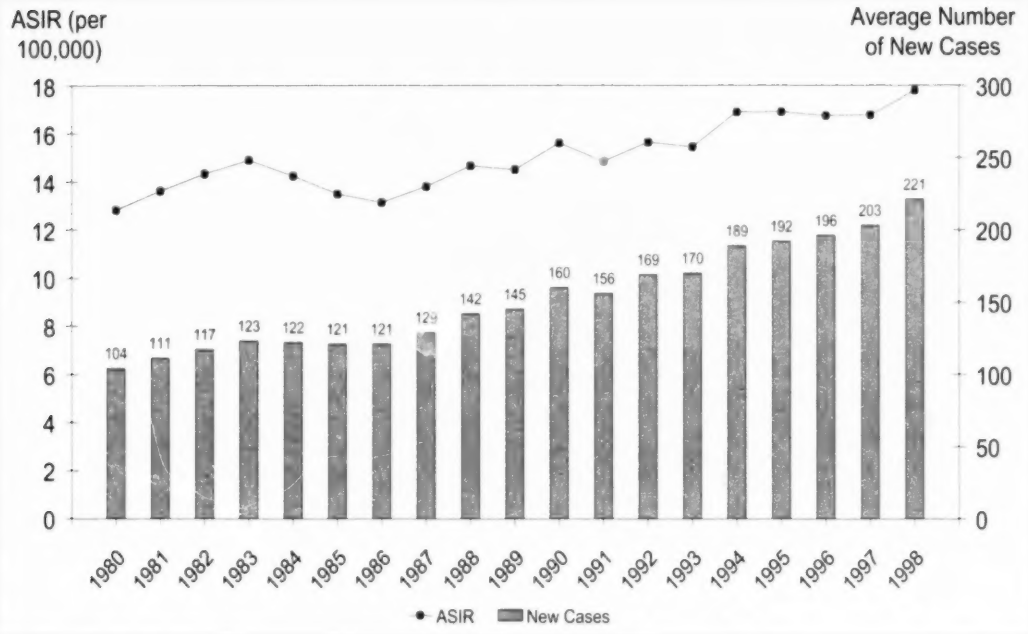
** Camelos, George P., Andrew Lister and Jeffrey Sklar. *The Lymphomas* (Philadelphia: W.B.. Saunders Company, 1998) 58.

Age-Standardized Incidence Rates (ASIR) and New Cases for Non-Hodgkin Lymphoma, Males, Alberta (1980-1998)*



Non-Hodgkin lymphoma age-standardized incidence rates have been increasing in males. This is similar to the pattern seen in Canada as a whole. Males had a slightly higher rate of 18 cases per 100,000 in 1998 compared to 13 per 100,000 in females for the same year.

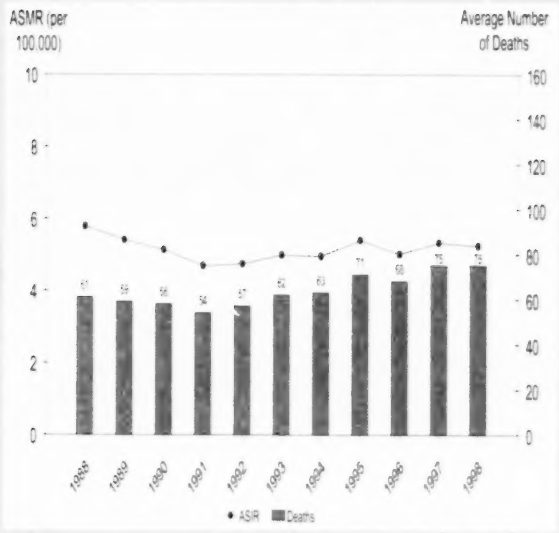
See the previous page for more explanation about the trends in Non-Hodgkin lymphoma.

* Three-year averages age-standardized to the 1991 Canadian population

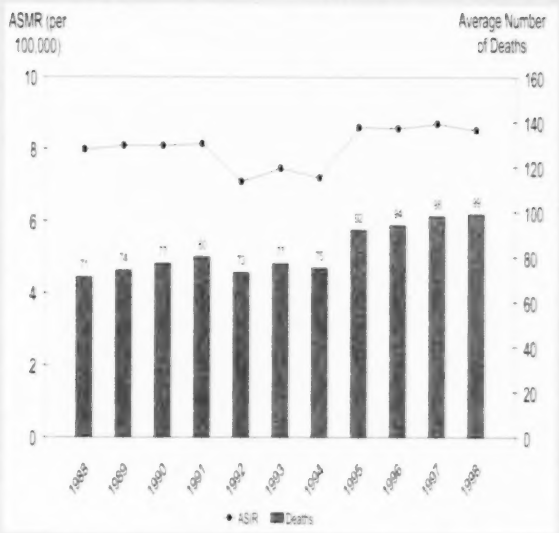
NON-HODGKIN LYMPHOMA - MORTALITY

Age-Standardized Mortality Rates (ASMR)* and the Number of Deaths for Invasive Non-Hodgkin Lymphoma, Alberta (1988-1998)

Females



Males

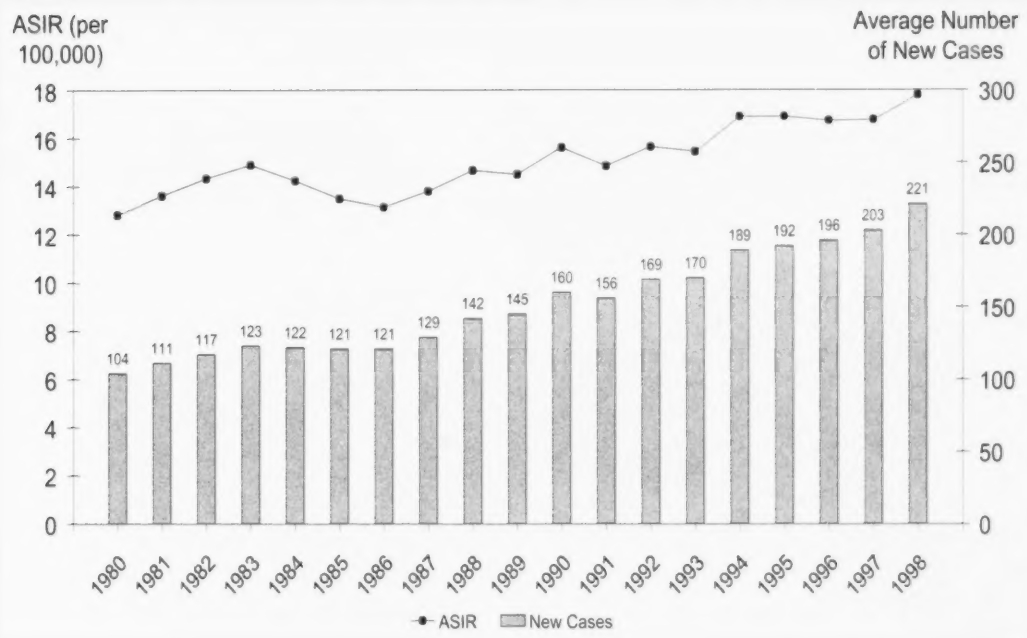


Similar to age-standardized incidence rates, mortality rates are slightly higher for males than for females. In 1998, males had a mortality rate of 9 cases per 100,000 compared to 5 per 100,000 in females.

Although the mortality rates for Non-Hodgkin lymphoma for both males and females are low compared to other invasive cancers, the number of deaths that occur in a given year is 45% to 50% of the number of new cases.

* Three-year averages age-standardized to the 1991 Canadian population

Age-Standardized Incidence Rates (ASIR) and New Cases for Non-Hodgkin Lymphoma, Males, Alberta (1980-1998)*



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* Three-year averages age-standardized to the 1991 Canadian population

NON-HODGKIN LYMPHOMA - MORTALITY

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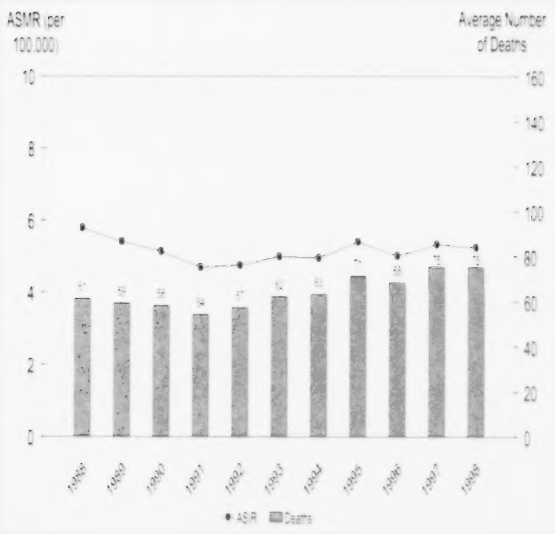
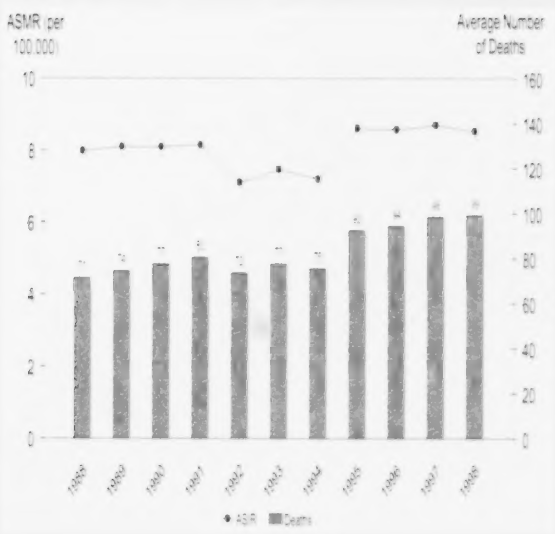
Females



Males



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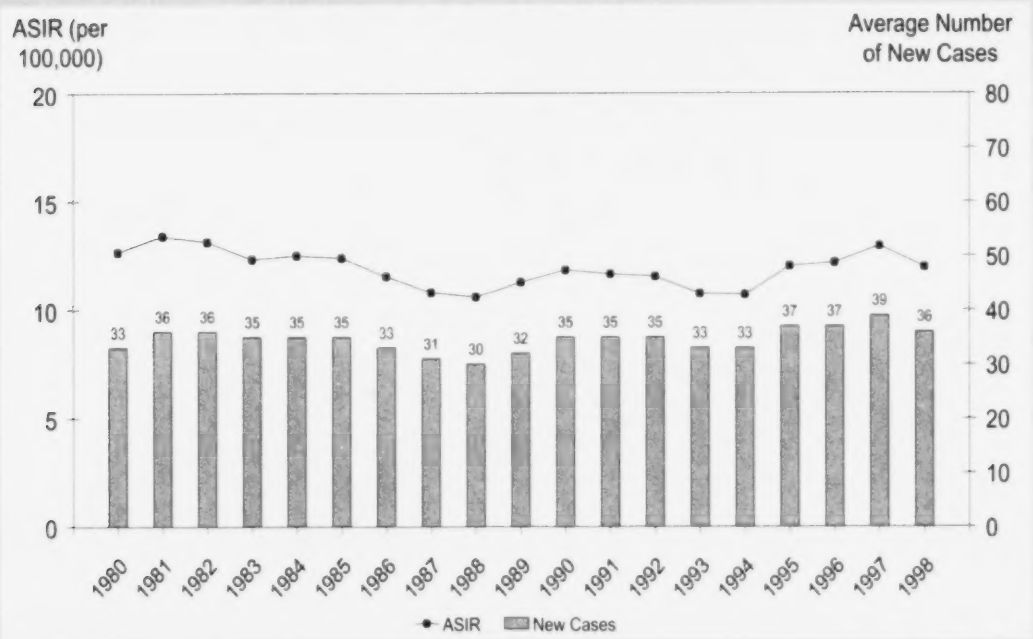
* Three-year averages age-standardized to the 1991 Canadian population

PEDIATRIC CANCER - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for Pediatric Invasive Cancer (less than 15 years of age), Females, Alberta (1980-1998)



Cancer is much less common in children than in adults. The types of cancer seen in children also differ from the common cancers in adults. The most common cancers in Alberta children are leukemia and lymphoma.

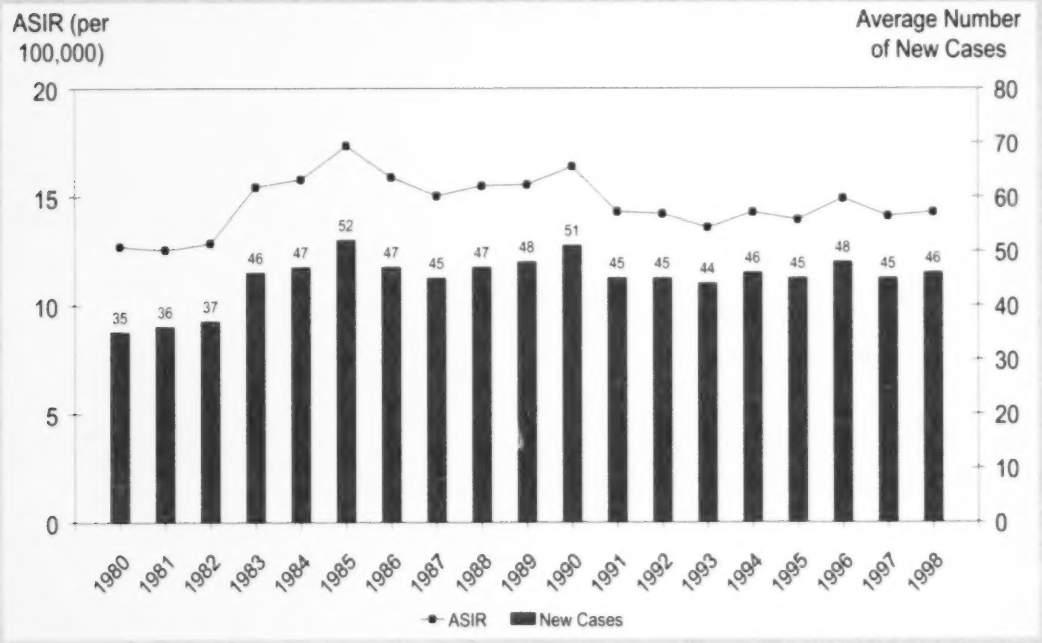
The causes of cancer in children and adults are different. In adults, many cancers are due to a long pattern of lifestyle factors such as nutrition, which haven't had an opportunity to play a role in pediatric cancer.

The incidence rate** of pediatric cancer has remained relatively stable over time.

* Three-year averages age-standardized to the 1991 Canadian population

**Note that in the June 2000 Regional Picture report, incidence rates for pediatric invasive cancer were standardized to the entire population. In this report, incidence rates were standardized to the pediatric population only, which accounts for the apparent increase in rates for both males and females.

Age-Standardized Incidence Rates (ASIR) and New Cases for Pediatric Invasive Cancer (less than 15 years of age), Males, Alberta (1980-1998)*



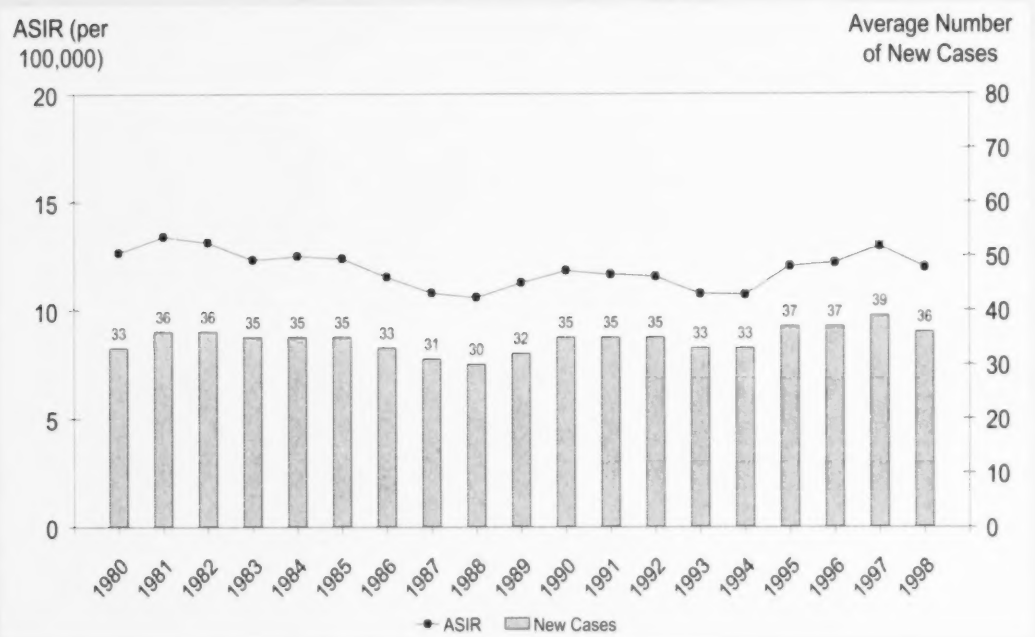
Pediatric invasive cancer occurs slightly more frequently among boys (14 per 100,000) than girls (12 per 100,000).

See the previous page for an explanation about pediatric invasive cancer.

* Three-year averages age-standardized to the 1991 Canadian population

PEDIATRIC CANCER - INCIDENCE

Age-Standardized Incidence Rates (ASIR)* and New Cases for Pediatric Invasive Cancer (less than 15 years of age), Females, Alberta (1980-1998)



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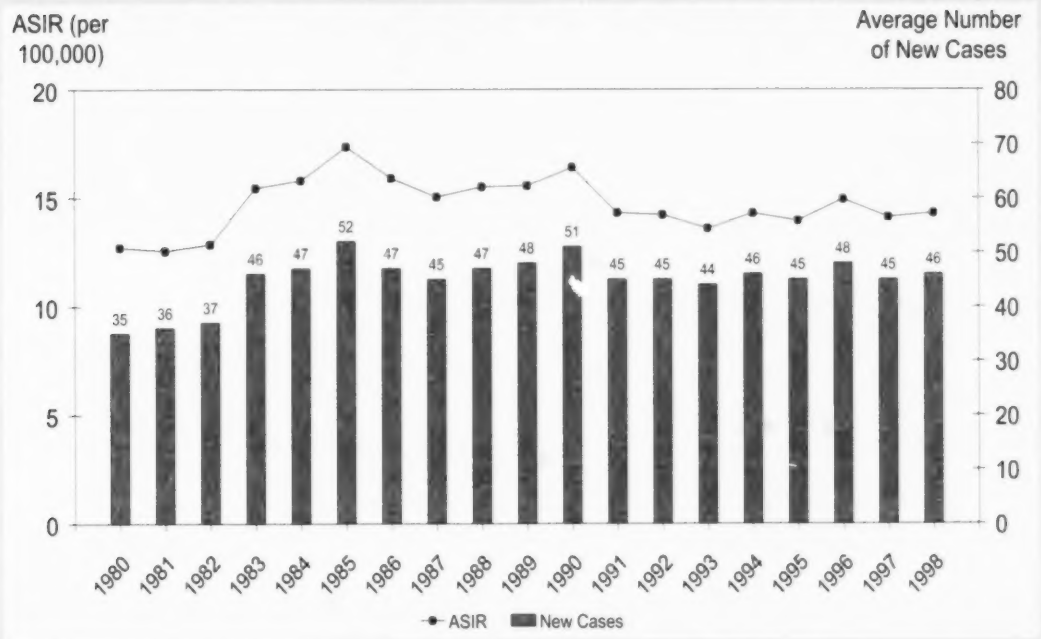

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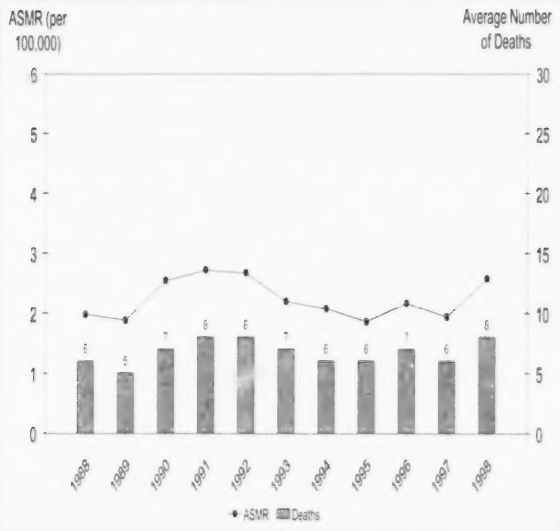
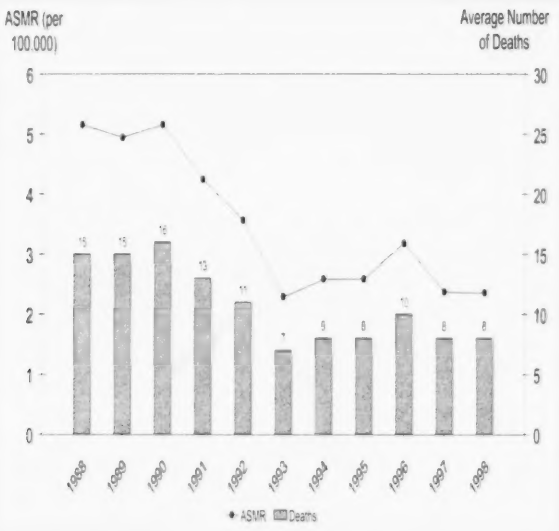
PEDIATRIC CANCER - MORTALITY

Age-Standardized Mortality Rates (ASMR)* and the Number of Deaths for Pediatric Invasive Cancer (less than 15 years of age), Alberta (1988-1998)

Females



Males



Many cancers in children are successfully treated. In 1998, 2 per 100,000 males and 3 per 100,000 females died from pediatric invasive cancer.** There is a high variability year-over-year because the numbers are so small.

Over the past 20 years, there has been a marked improvement in survival for children with cancer, due to advances in treatment resulting from cancer research.

* Three-year averages age-standardized to the 1991 Canadian population

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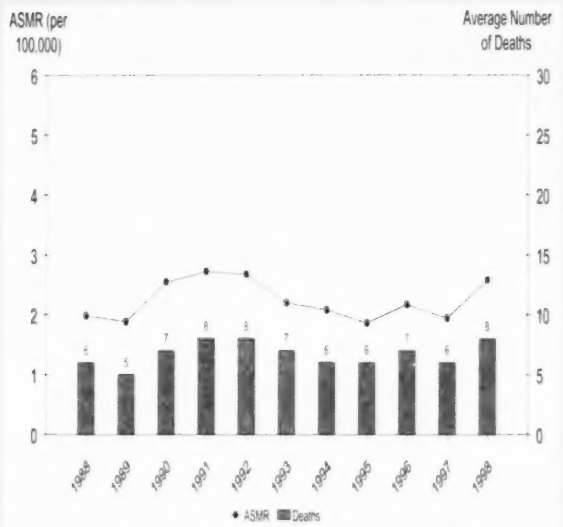
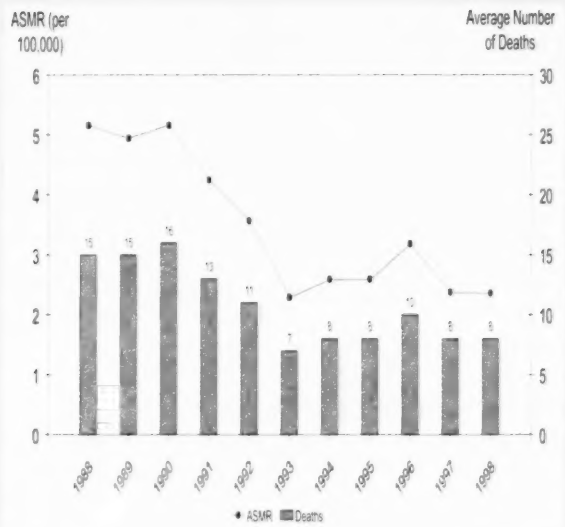


Males



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TECHNICAL REPORT

Data Preparation

The data for this report comes from the Alberta Cancer Registry. The Alberta Cancer Registry, of the Alberta Cancer Board's Division of Epidemiology, Prevention and Screening, records and maintains data on all new primary cancers and cancer deaths occurring in the province, as mandated by the Cancer Programs Act of Alberta. The Cancer Registry tries to capture all invasive and in situ cancers diagnosed amongst Albertans as well as borderline conditions and central nervous system tumours that have been seen at an Alberta Cancer Board facility.

The Alberta Cancer Registry, established in 1942, began compiling population-based data in 1950. However, due to consistent coding, data entry and data retrieval techniques, data starting from the 1970s are considered more reliable. At that time, the Cancer Registry became patient based, rather than tumour based.

The Alberta Cancer Registry operates out of two centres. The Calgary centre is responsible for the southern half of the province, while the Edmonton centre maintains data collection for the northern half of the province.

Sources of Data

Population

For the period from 1995 to 1999, Alberta Health and Wellness have supplied the population data for Alberta and its Regional Health Authorities. These population estimates are based on the Alberta Health and Wellness Stakeholder Registry and have been adjusted to account for the April 2001 boundary changes. Prior to 1995, Statistics Canada supplied population figures for the province. The agreement between Statistics Canada and Alberta Health and Wellness population estimates is quite high. For example, in 1996 there is less than a two-percent discrepancy between the overall population figures.

The standard population used in the age-standardized rates is the 1991 Canada Standard Population. This is the Canadian population distribution based on the final post-censal estimates of the 1991 census, adjusted for under-coverage.

Residence

All data in this report relate only to those people who were resident in Alberta at the time of diagnosis or death. The RHA of residence is determined primarily from the postal code. Alberta Health and Wellness has supplied a postal code - RHA conversion file (April 2001) for the most recent RHA boundaries. The Alberta Cancer Registry has also developed a conversion file of community name and RHA.

For incidence, the Standard Geographic Code or the Postal Code determines residence. Standard Geographic Code is available for 99.7% of cases and postal code for 98.3% of all cases registered (resident and non-resident).

For mortality, residence is determined from the death certificate. RHA of residence is defined from postal code and/or town of residence as recorded on the death certificate. Approximately 80% of death certificates have a postal code and only one or two cases per year are missing town. Where both postal code and town are recorded on the death certificate there is less than 0.5% disagreement on RHA designation. Agreement between postal code and town (where both are recorded) as to resident/non-resident of Alberta is almost 100%.

Incidence

Provincial incidence trends are calculated using data from 1979 to 1999. Since three-year averages are used, the graphs show trends from 1980 to 1998. The Alberta Cancer Registry learns of new cancers from a variety of sources. Laboratories throughout the province send a copy of each pathology report with a diagnosis of cancer to the nearest Alberta Cancer Board facility. The reports are then available to the Registry. Other items that also may be received are operative reports, discharge summaries and X-ray reports or scans.

All incidence tables and graphs represent new cancers and not the number of Albertans with cancer, as a person may have more than one type of cancer.

Mortality

Provincial mortality trends are calculated using data from 1987 to 1999. Since three-year averages are used, the graphs show trends from 1988 to 1998. Mortality data prior to 1987 are not presented because of problems with missing data on cause of death.

Alberta Vital Statistics sends the Cancer Registry an electronic file with a list of every death occurring in Alberta. These data are linked to the Registry to identify cancer cases that have died. Information on the date and cause of death is entered. Autopsy data, if different from the original diagnosis, is also entered. Cancer Registry staff may modify the death cause listed on the death certificate based on information available in the patient's medical record (see: 'Coding' section). Less than one percent of new cancer cases are registered through the death certificate only.

Coding

Methods for coding cancers have evolved over the years and continue to be refined. Cancers are currently coded according to the International Classification of Diseases for Oncology, second edition (ICD0-2) which classifies all tumours by site and morphology. The primary site of incident cancers is the tissue or organ in which the cancer originates. In general, data are tabulated by a three-digit topography code with some exceptions. For certain morphologies such as lymphomas, classification by morphology takes precedence over topography.

It is possible for one individual to be diagnosed with more than one incident primary tumour, either at the same time or subsequently. The Alberta Cancer Registry follows the SEER rules for coding multiple primaries, which in general records separate primaries if the histology (sub) site or laterality is different from a previous cancer, or a new cancer is diagnosed more than 2 months after the initial diagnosis that is not stated to be recurrent or metatastic. SEER (Surveillance, Epidemiology and End Results Program) is a program of the United States National Cancer Institute that collects and publishes cancer incidence and survival data from population-based cancer registries. NAACCR (North American Association of Central Cancer Registries), in which the Alberta Cancer Registry is an active member, supports the use of SEER coding rules for multiple primaries.

Microscopic examination of tissues or cells is the definitive diagnostic test for cancer. During the period 1994-1999, 93% of all cancers registered in the Alberta Cancer Registry were microscopically verified. In particular 98% of breast cases, 93% of prostate cases, 87% of lung cases and 96% of colorectal cancer cases were microscopically confirmed.

The completeness of case ascertainment may be estimated by an index derived from the ratio of the age-standardized incidence to mortality rates. For 1995-1999 relative to the combined SEER registries, the relative completeness of the Alberta Cancer Registry was estimated to be approximately 95%.

The underlying cause of death is coded according to the 9th edition of the International Classification of Disease (ICD-9). Data are tabulated by three-digit codes.

The Alberta Cancer Registry reviews the underlying and contributing cause(s) of death for all Albertans with a mention of cancer on the death certificate. If the cause of death is inconsistent with the person's last known condition further information is requested. Based on this information the underlying cause of death is reviewed and may be coded on the Registry as different from that appearing on the death certificate. In 1997, approximately 85% of deaths had the same ICD-9 three digit code, 5.4% were deemed to be in the same site (e.g. head and neck), and 3.1% were coded as primary unknown on one source and specific site on the other. In only 6% of deaths was there significant disagreement.

Statistical Methods

Average Number of New Cases

Average numbers of cases and deaths are plotted to describe the trends in the total burden of cancer and also reflect the changes in population structure.

Age-Specific Rates

Age-specific rates are calculated by dividing the number of incident cases or deaths occurring in a given calendar period, in a given age group for a particular sex by the corresponding age, sex specific Alberta population for the calendar period. Age-specific rates are expressed per 100,000 person years and reflect the relative changes in the underlying rates.

Age-Standardized Rates

Age-standardized incidence and mortality rates are presented because rates vary with age and if the crude rates [total number of cancer cases/(total population x period of observation)] are used for comparison purposes, they will be affected by differing population age structures. Age-standardized rates estimate the average cancer incidence rate that would have occurred in a standard population if the actual age-specific rates within that region had prevailed in the standard population. To compare cancer incidence rates over time, or with other geographic areas, all rates to be compared should be standardized to the same standard population. The 1991 Canadian Census population is used as the standard population in the calculation of the age-standardized cancer incidence and mortality rates in this document.

Three-Year Averages

In all plots of trend over time, three-year averages are used to smooth out the effects of random year-to-year variation. These are calculated for frequencies by averaging the numbers over three-year periods centred on a given year, and for rates by summing the number of cases over the three years and dividing by the sum of the three mid year populations. Averages are presented for 1980 to 1998 for incidence, and for 1988 to 1998 for mortality.

Data from 1979 to 1999 are included for incidence and from 1987 to 1999 for mortality, because of the use of three-year averages. The shorter period is used for mortality because the quality of the pre 1987 mortality data is not adequate for analysis.

Confidence Intervals

A confidence interval is indicative of the precision of the estimate and in these data is mainly a reflection of the population size on which the estimate is based, and not on the quality of the data collected. The method of the binomial approximation for the standard errors has been used.

Survival Curves

Relative Survival has been used in the analysis of the Alberta Cancer Registry data. Relative survival compares the observed survival of cancer patients with the expected survival of members of the population with the same age and sex characteristics. This is the preferred method of estimating disease specific population based survival since it does not depend on the accuracy of the death certificate cause of death. Throughout this publication, Hakulinen's method of relative survival has been used. Provincial life tables, published by Statistics Canada, have been used to estimate expected survival.

To be consistent with other Canadian publications and to have comparable survival figures, the methodology and inclusion-exclusion criteria of the Canadian Cancer Survival Analysis Group (CCSAG) have been followed. Details of this methodology can be found in a recent Statistics Canada publication,* or by contacting any member of the CCSAG.

* Ellison L, Gibbons L, and the Canadian Cancer Survival Analysis Group. Five-year relative survival from prostate, breast, colorectal and lung cancer. *Health Reports 2002*; 13(1): 1-12.

Cancer in Alberta

A Regional Picture

Regional Data In Pocket

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